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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CXXXVII. No. 2802.] LONDON, JANUARY 23, 1917. [69TH YEAR. PRICE 6d.

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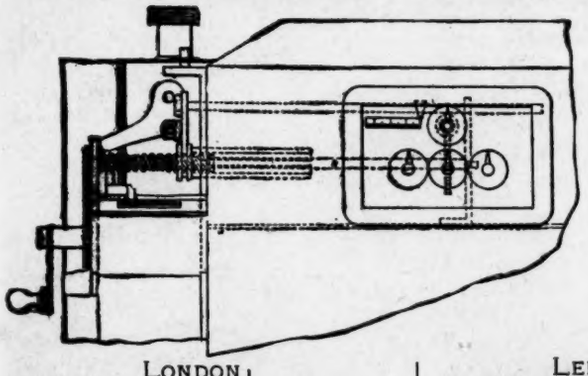

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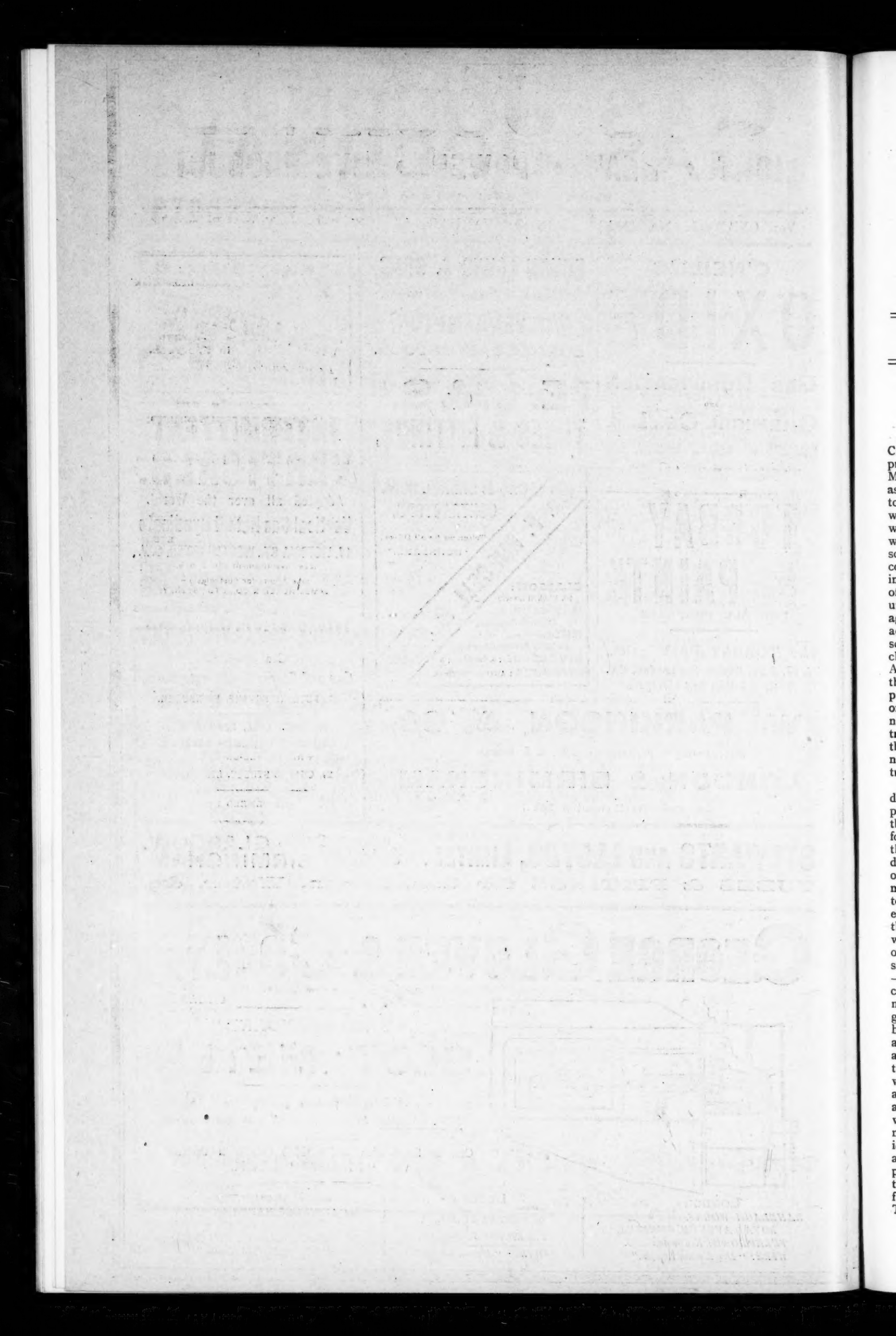

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXXXVII., No. 2802.] TUESDAY, JANUARY 23, 1917. [69TH YEAR.

EDITORIAL NOTES.

Sulphuric Acid and Trade Ideals.

COMMENTING in the "JOURNAL" for Jan. 9 (p. 57) upon the proposal to form a National Association of Sulphuric Acid Manufacturers, we could only give such interpretation to it as was allowable from the written statement, which seemed to be pretty clear as to intentions. But since the article was published, we have had the opportunity of a long chat with someone who appears to be very well informed as to what is at the back of the mind of the originator of the scheme. It is gathered that, in this instance, "National" connotes something much more than meets the eye. It is intended that the Association shall serve not only the makers of sulphuric acid, but the nation generally by the methods under which the members conduct their business—if they agree with the plans mapped out for them. It is a pure accident—but it is a fortunate one—that the author of the scheme, being interested in sulphuric acid as well as other chemicals, suggested a National Association of Sulphuric Acid Manufacturers as a suitable place at which to begin the materialization of his ideals, which have a much wider purpose—the infusing of a broad national spirit into trade organization, so as to create a real partnership between the nation and the industrial optimates, with the view to industry being run for the common good, with a fair reward for those conducting the enterprise (whatever its nature), and not an extortionate one, such as can be commanded through trade organization and collusion of members.

These ideals and their general application were not divulged by the bare outline of the scheme as originally published; but if we understand our informant correctly, the author of it believes the ideals would be the panacea for many of the ills from which industry and commerce at the present time suffer. While we do not for one moment doubt the sincerity of the author (assuming the correctness of our information), we have not sufficient faith in the oneness and submissiveness of human virtue to bring ourselves to think that any industry could be found the constituent elements of which would be willing to divest themselves of their present liberty, and come under governmental control, which alone would give the Legislature any right to prohibit other men from embarking their own private capital in the same industry, and taking a share in competitive enterprise—assuming that they kept themselves clear from the toils of combinations which agree price and come to other arrangements which altogether undermine the principles and laws governing free trade and competition from which consumers benefit. We are aware, for instance, that the sulphuric acid trade is not without knowledge of understandings and arrangements that have been more beneficial to the makers than to the consumers; and we have yet to learn that those who have engaged in this sort of thing have arrived at such a contrite and plastic state that they are now prepared to atone for the past by coming under outside control, which will once and for aye deprive them of the liberty that they now possess. Saying which we are not asserting that the ideals of the originator of the scheme would not be preferable to working along lines which are an abuse of right principles in, and liberty of, trade. But we do not think that there will ever be consummation of his purpose by the free will (say) of the makers and vendors of sulphuric acid. To realize his aim, there would have to be compulsion; and the first step taken by the author should be to attempt the conversion of the Government to the belief in the correctness of the principles of control of industry generally, and then invite them to make first experiment on the sulphuric acid and chemical manufacturers. That is a constructive suggestion in the matter of ways and means of achieving a result.

As intimated, the originator of the scheme (assuming the accuracy of our information) would desire that his ideals should be regarded nationally, and not from the point of view of any single industry. He would like to see industry and business conducted throughout the United Kingdom on a co-ordinated basis—just as much in the interests of the nation as in those of the manufacturers. Co-ordination would mean economy; and economy is what the country very much desires. Co-ordination in any single industry would involve dividing the country by the allocation of customers, or by adjusting it on quotas over a long period of years. And what a fearful mess would be made of this, and what scope there would be for grievance and dispute! The millennium is not here; and the earth is not peopled by saints. However, the allocation of customers and the adjusting of trade on quotas would involve fixing prices, or a limit beyond which the manufacturers could not go. When protection is given to an industry, there must be a *quid pro quo*. Under such a scheme the makers would periodically exchange costs and other information—say, every three months. By pooling information in this manner, lower costs would accrue, which would be (with the fulfilment of the ideals) of great national advantage. It would be to the advantage of all the industries in this country using (say) sulphuric acid that it should be made cheaper here than by any other nation in the world, so that they could purchase at a cheaper rate, and a larger export trade be secured.

Having got so far on the road with the idealist, it is obvious that it would be an easy thing (if all firms made honest returns) to average costs, including depreciation and all charges other than capital, per ton of their production. Having obtained the average working cost as a basis upon which to proceed, it would then be a simple matter for the Government to fix the profit that should be allowed upon this average cost. The gas industry would not have the slightest objection to seeing the sulphuric acid makers outside its own boundaries under such a scheme, providing that, as a condition to this meritorious plan, no attempt was made to stop the gas industry utilizing in the best possible way its own production of sulphur. Anything that can be done to lower the costs of making sulphuric acid, with a fixed profit upon these costs, would be to the advantage of the gas industry. However, under such a scheme, there could hardly be the same incentive to individual effort and individual economy when the results would be open equally to the whole of the manufacturers, unless the incentive is to be found in the fact that the lower the costs the higher the output, and therefore the greater the number of tons that would be disposed of upon which the fixed profit would be obtained. Lower costs would certainly help the export trade; but we doubt very much whether many tons more would be sold at home as the result of the price which included a fixed profit—seeing that industries which must have sulphuric acid in order to exist must buy it just as much as a human being must buy food in order to sustain life. Furthermore, under such a fixed profit scheme with average costs as the foundation, there would be a defence

as between capital and labour, seeing that the pay of labour would also be fixed, forming as it would do an item of the basic costs.

There can be no complaint of any scheme that aims at producing economy for the nation. We may be a bit sceptical as to this particular one ever coming to anything; but the author, if these notes happen to meet his eye, may rest assured that it has our sympathy. Indeed, very earnestly we suggest to him that he should try to realize his ideals among the sulphuric acid makers and chemical manufacturers. But knowing something of their ways, we cannot share any hope that his enthusiasm may permit him to entertain as to success attending his efforts, without compulsion is applied. Perhaps, if he fails here, he might be more successful in another quarter of the industrial world.

The Sulphate of Ammonia Market.

IN last week's issue, reference was made to the appointment of a Fertilizers' Committee in connection with the Department of the Food Controller (Lord Devonport). Associated with this appointment, and the powers conferred upon the Controller, is the question of the reservation for this country of the whole of the home-produced sulphate of ammonia, in the laudable desire to intensify the cultivation of food produce, with the collateral result, however, of dispossessing the producers of sulphate of ammonia of a considerable amount of revenue from export trade, which revenue, in the case of the gas industry, can be ill-spared, having regard to the heavy burden of additional costs which the war has imposed. Between desire and practical expediency and probabilities, there should be the very closest scrutiny by those possessing the authorization to control; and we hope that the new Fertilizers' Committee will exercise judicial care before coming to a final decision. Allusion is made to this point of reservation of sulphate for home application in the newly issued annual report, of Messrs. Bradbury and Hirsch. They consider that, owing to the inflated price of nitrate of soda (through shortage of supplies, extraordinary rates of freight, and utilization for munitions making), as well as the scarcity of other nitrogenous fertilizers, the relative cheapness of sulphate of ammonia ought to bring about a much larger reversion to the use of it for the coming spring season; but "to talk of reserving the entire output in the United King-"dom, as some economists are doing, is, if it refers to the "immediate future, to talk nonsense." Moreover, it would involve an entire revolution in home agriculture, which, for reasons perfectly obvious to agriculturists, cannot be brought about in one or even two seasons. Export business would be crippled, stocks would become unwieldy, and the sugar-growing colonies would be starved. The question is one that cannot be looked at and determined from one side only; it is necessary to examine it from all sides before coming to any positive conclusion. The figures for the past year ought to satisfy the economists and the food production energizers that, in urging the total reservation of production for home use, they are proposing something of a stupendous and impossible character.

Let us look at the nearest figures available, which are those presented by Messrs. Bradbury and Hirsch, who in the existing muddled circumstances can only, for the time being, vouch for their approximate accuracy. The total home production of sulphate of ammonia last year is put at the abnormal figure of 438,000 tons, which is an addition of 12,000 tons on 1915—an addition which is attributed entirely to coking and producer gas plants, and which makes their output 190,000 tons, though we should be surprised to find that—notwithstanding the demand for metallurgical coke has been so considerable for munitions work—the 175,000 tons of sulphate credited to gas-works is a little short, owing to the reduced manufacture of carburetted water gas (on account of the position and price of oil supplies). The Board of Agriculture, the Sulphate of Ammonia Association, the newspapers, and persons interested in the subject of agriculture, either as experts, amateurs, or economists, have been trying to stimulate the farmers to a greater application, at regulated prices, of the home-produced fertilizer; and what is the total result on the showing of Messrs. Bradbury and Hirsch?—that of the total production only 178,500 tons (including the consumption in the manufacture of ammonia soda, munitions, and chemicals) were utilized at home, while 259,500 tons were exported. The use at home was about 50,500 tons more than in 1915, while the quantity exported was 34,808 tons less than in 1915, and 54,377 tons less than in 1914. There remained a stock of 26,000 tons to be carried forward, which is the equivalent of the quantity brought into the year. The makers have therefore lost considerably on export trade (there has been no absence of demand) at the higher prices, while the home prices have been regulated at lower figures (with latterly the controlled maximum prices of sulphuric acid raised). And now a fresh authority has to be encountered, whose views as to regulation, both of production and prices, have yet to be disclosed. The trend of affairs in future is at the moment open to considerable doubt; its shaping has been very much removed from makers' hands and from the ordinary influences of the fertilizer markets and the law of supply and demand.

Regarding statistical information as to prices supplied by Messrs. Bradbury and Hirsch, those referring to sulphate of ammonia only include the market rates applying to export, and not to the prices fixed by the Board of Agriculture. But even the variable price showed material fluctuation—beginning the year as it did at £17 10s., and closing at £18 15s., although only giving an average for the year of £17 7s. 10d. Nitrate of soda finished up at the high price of £19 15s. per ton; but it started the year at £15 5s. Thirty-five years have elapsed since a higher average price was obtained for sulphate of ammonia. In 1882, the average was £20 8s. 6d.; the next highest average was in 1883, when it was £16 11s. Last year's average, therefore, comes between the two. But, of course, the circumstances of the years through which we are now passing have no parallel, and so all comparative value is removed from the figures.

Estimation of Benzol in Coal Gas.

THE paper which Dr. Lessing presented at the meeting, on Monday of last week, of the London Section of the Society of Chemical Industry, draws attention to the important problem of the estimation of benzene and other hydrocarbon vapours in illuminating gas, and the industrial methods of extracting them. The organization of the meeting at which the paper was presented not being favourable to a proper realization of its contents on the part of the audience, it is not altogether surprising that there was no discussion of it at the time. Obviously this apparent want of interest was not due to any disparagement of subject or author by his hearers; and we therefore think it may be useful to point out what appear to be the essential features of Dr. Lessing's "New Method of Extracting Vaporous "Constituents from Coal Gas." A report of the summary which Dr. Lessing gave of his paper appears on another page of to-day's "JOURNAL."

By chemists engaged in investigating or supervising the gas produced in coke-ovens, gas-works, shale retorts, and low-temperature carbonization plants, the removal from coal gas and carburetted water gas of the vapours of benzene, toluene, &c., for the purpose of their estimation and examination has been for many years past carried out by washing the gas by means of heavy oil. Bubbling tubes, absorption bulbs, and diminutive scrubbers packed with gauze, beads, marbles, tubes, rings, &c., have been employed to secure intimate contact of the oil with a stream of gas, of which the volume passed is measured by an experimental meter. In some cases, chemists have dried the gas before its entry into the oil-charged absorption apparatus, and so have secured an approximate estimation of the abstracted hydrocarbon vapours merely by noting the increase in weight of this apparatus. Others, however, have preferred to volatilize these hydrocarbons from the oil used, because thereby they are enabled to condense them for subsequent examination as to their specific nature. In this way a considerable amount of valuable information has been gained regarding the constitution of the hydrocarbon vapours in gas—more especially that from carburetted water gas plant and low-temperature coal and shale distilling plants. There are a number of objections to the use of ordinary laboratory bubbling tubes, absorption bulbs, and the like; the chief being that they throw considerable back-pressure, and are too small to admit of a reasonably large volume of gas being "stripped" of its hydrocarbon vapours in a short time. Hence chemists investigating works' processes usually have devised some type of diminutive scrubber, made in metal, and with metal, glass, or glazed porcelain filling in some form which exposed to the passing gas a large surface wetted with oil. Sometimes provision has been made for a continuous supply of fresh

oil, which drips into the apparatus near the gas outlet. No one appears, however, to have stereotyped or standardized such types of apparatus, probably because they were only called for in special investigations, and were not needed in the routine work of gas testing.

Recent developments have rendered the estimation and examination of the hydrocarbon vapours in illuminating gas a more frequent necessity on gas-works; and the apparatus shown and described last week by Dr. Lessing appears to afford a convenient means of carrying it out. The essentially novel points in his apparatus, so far as we understand from the description (which, under pressure from the Chairman of the meeting, he had to curtail to the verge of obscurity), are the use of absorbent material in the scrubber, and the subsequent recovery of the extracted hydrocarbons by volatilization by superheated steam applied to the scrubber itself. The oil used for the extraction saturates the pieces of porous filler, and is of a grade not volatile in superheated steam. Thus the same oil may be repeatedly used without removal from the scrubber. The steam is provided in the apparatus itself by means of bunsen burners. The general arrangement suggests that the apparatus is best adapted for regular use on the same stream of gas in the laboratory itself. It would be useful to hear the views on Dr. Lessing's apparatus which should have been forthcoming at last week's meeting, and especially as to whether, for portable and varied uses, a scrubber packed with non-porous material from which at the conclusion of the test the oil is run and flushed-out for subseqent treatment in separate apparatus in the laboratory, has not distinct advantages, which may altogether outweigh the disadvantages Dr. Lessing seeks to avoid.

The "Lumen" and Distribution Curves.

SOME of our electrical friends are highly anxious to revolutionize and revise means and methods of evaluating and stating lamp capacity. On the one hand, they seek to rate their lamps on the wattage input, and not on the light output; and as the latter has not a definite relation to the former for electric lamps, any more than light output has to gas consumption in gas-lamps, the proposal oversteps the line between commonsense and absurdity. On the other hand, they have been trying to establish the "lumen" as expressing the total light emission of a lamp. Here, again, they have an eye upon the erratic directional light emissivity of the various types of filaments in electric incandescent lamps, owing to which hardly two lamps can be found which give their maximum light in the same direction. They therefore want a method of light evaluation which will give them the total flux of light in all directions, no matter the directions in which the maximum and minimum light are given, and no matter whether, if the maximum be in the upward direction, there is loss due to the need for reflection, which loss increases with the ageing of reflectors and surfaces. The lumen method of testing therefore obscures the actual useful light value of lamps; and the useful light is what is wanted by the person most concerned in the running of the lamps. He cares nothing for flux, lumens, mean spherical candle-power, lower hemispherical candle-power, or any of these things. He wants the lamp which will give him the most useful light, without auxiliary means, on the most economical terms; and the lumen offers no positive satisfaction in this respect. The gas industry is not likely to agree to any foisting upon it by the electricians of a method of evaluation that is further removed from practical requirement than anything before proposed, and which is proposed solely for their benefit to meet the inglorious dissimilarity of the light-radiating performances of lamps.

The matter was discussed at the meeting of the Illuminating Engineering Society last Tuesday, on two papers by Prof. J. T. Morris and Mr. F. W. Willcox. Both authors were heart and soul in favour of the lumen—the one being a Professor of Electrical Engineering, and the other associated with a noted firm of electric lamp makers. But we are glad to find that Mr. J. G. Clark, of the laboratory of the Gas Sales Department of the Gas Light and Coke Company, was present, and gave voice to his doubts as to the advisability of substituting the lumen for a complete distribution curve. The objection to the former does not rest solely on any consideration for the consumer, though the best service to the consumer must always be the ultimate goal in these matters. In tending to obscure the polar curve, the lumen would help to destroy the incentive of the makers to improve these curves from a practical point of view. Some of the speakers who followed Mr. Clark seemed to suggest that distribution curves would still be given. But this only weakens their argument, because the lumen really is derived from the polar curve. Then, again, only those who are competent to deduce lumen values from existing data can be trusted to use them. It is quite true that the present methods of rating lamps are liable to be misinterpreted by incompetent persons, but things would be equally bad, if not intensified, with the lumen.

It would, indeed, be a matter for regret if the complete distribution curves (which are of a fundamental character, and all a competent person requires) which the leading gas-lamp makers now provide were superseded or subordinated by something else, unless the "something else" is really better. Even with electric lamps, the lumen rating will lead astray, unless accompanied by a distribution curve or by zonal values in lumens; and, of course, zonal values in lumens would be practically only a variation of the distribution curve. From Mr. Clark's remarks, we get an illustration of the difference there may be between two lamps of equal lumen values in the matter of useful efficiency. Suppose one of the lamps gives 70 p.ct. of its rays above the horizontal, and 30 p.ct. below; and the other the reverse. The light above the horizontal must be redirected downwards by means of a shade. If the shade reflects (say) 60 p.ct. of the light that falls upon it, then 40 p.ct. is lost. Therefore, the lamp which gives the larger quantity of light in the downward direction, leaving the smaller quantity to be dealt with by the reflector, will give the best practical result, although its lumen rating would be no more than another lamp which sends most of its light to the reflector to be inefficiently reflected. This point becomes still more important if the reflecting power of the shade is depreciated by soiling.

The conclusion that one arrives at is that the distribution curve is a complete and truthful portrayal of the competence of a lighting unit for useful work; and all other methods of rating should be subordinated and supplementary to it, as is the case at present. It supplies an incentive to the makers, and provides the competent man with all he needs. In the circumstances, the gas-lighting industry should still stand out against the adoption of a method of rating that is inferior from the practical standpoint.

Nitrogen and Calorific Power.

NOTICING last week (p. 122), the application of the East Grinstead Gas and Water Company to the Board of Trade for an Order under the Gas (Standard of Calorific Power) Act, it was mentioned that the District Council are opposing with the view of getting certain conditions placed upon the Company that are in excess of those which the Board of Trade have laid down—through the Sheffield Order—as being generally applicable, unless some very special circumstances will warrant variation, though certain detail modifications may be made as seem good to the Board—such as the broader character of the terms in the Lea Bridge Order (p. 165) relating to the quinquennial power of appeal for revision. However, among the requirements of the East Grinstead District Council is one that the gas shall not contain above 10 per cent. of nitrogen and carbon dioxide. There is no precedent for this; but its appearance among the conditions the Council would like to see applied in connection with the standard of calorific power is rather peculiar. It would be a singular thing if there is any member of the Council who knows much, if anything, of the constitution of gas and of the relative effects of the different components; and so it may be assumed that they have been advised to ask for this limitation. It just happens that for some little time past there have been subterranean testings proceeding in different gas-supply areas, to ascertain the proportion of inert constituents that there is in the gas, with what object is patent, and with what result may at some time come as a not altogether agreeable surprise to responsible officials. The gas industry has had enough regulation imposed upon it at one time and another; and it does not want any more. But if percentages of nitrogen are admitted into the composition of gas which are injurious to consumers and to the gas suppliers' own business and reputation—percentages which degrade the flame temperature of gas, and have a restraining influence upon the production of the highest temperatures in furnaces—then it will be the fault of those gas makers who have no care in this matter if an additional

burden is placed upon the industry in this respect, and they will not be thanked for their disservice to the industry. Every gas engineer ought to have his gas constantly tested on the works, to keep the inert constituents within bounds having relation to the coal used; and, except in the case of those undertakings that are found to be inveterate transgressors in respect of the proportion of incombustibles, there is no call for specific regulation in this matter. More need not be said; but there is room for warning.

Fraud and Bribery.

IF there is any difference between the bribery of a chief official and of a subordinate one to do some dishonest act, or to grant some favour, we should say that the greater dishonour attaches to a trading firm by the corruption of the subordinate; and for reasons too obvious to need mention. A case was before the Magistrate (Mr. Chester Jones) at the Lambeth Police Court yesterday in which three of the partners of Messrs. Kempton and Sons, gas globe and fittings makers, were charged with a man named Hallett in conducting systematically, over some months, a series of frauds on the South Metropolitan Gas Company, whereby financial benefit accrued to all the participators. We leave the details of the case to be gathered by readers from our "Legal Intelligence;" but it may be said here that to-day, all those who stood side by side in the dock—those who paid bribes and the tool who received them—are discharging by imprisonment the penalty of their misdeeds. There is not the slightest excuse for the man who falsified and received payment for his perfidy, though the greater offenders were those higher positioned men who tempted and rewarded him. So far as the gas industry is concerned, there is no use for men who can play such an underhanded game; and the endeavour to palliate the crime by the plea that the firm were "hard hit," to our mind only worsens the whole matter. The Directors of the Company were the proper persons to approach; to take the course of effecting gain or trying to retrieve loss through a subordinate official, and of rewarding him for his infidelity to his employers, was the depth of meanness. The Company acted in the only manner possible. The Directors had a duty to perform not only to the proprietors, but to the public, in bringing to punishment men who had violated honest trading through the channel of a subordinate official. It is to be hoped the case will act as a warning in other directions.

The "American Gas Engineering Journal."

The mail which arrived last week from the other side of the Atlantic showed that, strangely enough, just when the "JOURNAL" was changing its title, our old friend the "American Gas Light Journal" was doing precisely the same. Dropping the word "Lighting," as being no longer sufficient to cover the present-day field (which it practically did at the time of first publication), our contemporary has now become the "American Gas Engineering Journal"—a title which, of course, includes manufacturing, lighting, and industrial engineering in all its branches. Already well over half-a-century old, the paper, like the industry it serves, has, we feel sure, increased prosperity before it.

Liability for Gas Supplied.

The Lea Bridge District Gas Company are to be congratulated upon the result of an appeal by them to the King's Bench Division from a decision of a bench of magistrates dismissing a summons for the recovery of an amount for gas supplied. The sum involved was small, but the Company regarded the point raised as important; and as will be readily understood from all the circumstances of the case [a report of which will be found under the heading of "Legal Intelligence" in this issue], the matter has been persevered with by them really as a matter of principle, bearing on their own and other gas undertakings. By the unanimous decision of the High Court (consisting of the Lord Chief Justice and two other Judges), a widow who had remarried subsequent to a date at which, in circumstances set out in the case, she contracted for a supply of gas, is made liable notwithstanding this marriage, of which the Company had no knowledge at the time when they were supplying the gas. It will be noted that the Lord Chief Justice declared that the fact of the woman having married again did not prevent the Company from recovering for the gas supplied under the contract to pay for it—which the Court, on the facts, held did exist—until she gave notice that she had so married, so that the contract was at an end. The Company, he pointed out, knew nothing of this second husband; and if the magistrates were right, no one could be made liable—a state of affairs which would appear to be neither good justice nor, it would seem evident from the Court's decision, good law.

Crude Benzol and a Significant Fact.

The article in last week's issue on "Gas-Works and Peace," by "Cricket," together with the editorial comments on p. 104, had timely supplement in the Daily Press last week. The articles appealed to gas-works to do their utmost to provide, by means of oil-washing (where the system of carbonization has not a tendency to produce too high a proportion of paraffins, which spoil the benzenoid compounds, seriously hamper the recovery of the latter, and reduce plant capacity for the special purposes of the war), the largest possible volume of crude benzol in view of the intensity with which the war will have to be carried on to assure final victory. Last week Mr. F. Kellaway, M.P., Parliamentary Secretary to the Minister of Munitions, in writing on women's work in munition factories, spoke of the need for greater effort generally. He praised the work of Mr. Lloyd George and Dr. Addison at the Ministry of Munitions, and then wrote these significant words: "Germany is making a new and gigantic effort to overtake us in this war of material. She is bringing back from the colours great numbers of skilled men. Her levy *en masse* is placing at her disposal an immense supply of additional labour. We shall be making one of the greatest mistakes of the war if we do not realize the grave significance of the fact that Germany is striving to increase beyond anything yet imagined the material at her disposal when the time for a sustained and extended offensive returns." Gas managements who are not yet doing their very utmost in the provision of benzol should carefully consider this statement by Mr. Kellaway.

Constitution of Coal.

In the paper of which he gave an epitome on Monday last week before the meeting of the London Section of the Society of Chemical Industry, Dr. R. V. Wheeler, of the Home Office Experimental Station at Eskmeals, referred to the summary of Recent Researches on the Constitution of Coal which appeared in the "JOURNAL" of the 26th ult. (p. 646) and to similar summaries in the "Colliery Guardian" and the "Journal of the Society of Chemical Industry." Dr. Wheeler's remarks yesterday week, of which a short report appears on another page of to-day's "JOURNAL," did not disclose any new researches on his own part, but rather served as an introduction to Dr. Marie C. Stopes, who—speaking as a palæo-botanist—threw a light new to the chemists who formed the bulk of her audience on the problem of the elucidation of the constitution of coal. She exhibited on the screen photographs of sections of coal, magnified to varying degrees, which showed extremely well the spores in and structure of the coal. These sections had been cut chiefly by Mr. Lomax, and may be seen, as Dr. A. Smith Woodward pointed out in the course of the discussion, in the Geological Collection which is under his charge at the Natural History Museum. For some thinner sections, however, Dr. Stopes had been indebted to the American geologist, Mr. Geoffrey. There was no question that the address of Dr. Stopes interested and attracted the audience in an exceptional measure; and it may be suggested that a course of two or three lectures by her on the structure of coal, if open to the general public, would draw considerable numbers to her lecture-room at University College, where she holds the recently constituted Chair of Palæo-Botany. A series of such lectures would greatly help in procuring the collaboration of chemists with palæo-botanists, the absence of which Dr. Stopes deplored. We look forward, meantime, to the publication of the text of Dr. Wheeler's and Dr. Stopes' papers, of which only summaries were given by the authors at last week's meeting.

Papers and the Society of Chemical Industry.

We are reminded by this observation of the disadvantage under which the authors of papers presented to the Society of

Chemical Industry stand compared with technical authors who prefer to present their communications to one of the Engineering or other Technical Institutions, almost all of which have now adopted the excellent practice of circulating proofs of a paper a few days in advance of the meeting at which it will be "read." Even the younger Institutions, such as the Petroleum Technologists and the Municipal and County Engineers, find no difficulty in preserving their copyright, and meeting the expense of such preliminary publication; and it seems strange so old-established and wealthy a technical body as the Society of Chemical Industry should be content to lag behind in this matter. It is not surprising that the discussions at its meetings are commonly discursive and featureless, and only rarely are participated in by many leading practical chemists, technical men, and manufacturers. Whether or no the lack of early publicity which is afforded to papers presented to the various sections of this Society is responsible in some degree for the falling-off in its membership which set in some few years before the outbreak of war, we do not pretend to say, but there is no question some of the younger institutions provide better facilities for both authors and speakers to do justice to themselves and their subject-matter. We believe that Mr. Charles Carpenter, D.Sc., in his capacity as President of the Society, has already been instrumental in effecting several much-needed reforms in its procedure; and we cannot but think he must recognize that it would be to the advantage of the Society, readers of papers, members attending meetings, and the whole chemical industry, if proofs of the more important papers set down for "reading" were made accessible to those interested a few days before the date of the meeting, or at least at the meeting itself.

Furnace Demonstration.

If all branches of the gas business had been inaugurated and developed on the same practical lines as the gas-furnace department of gas undertakings in large industrial centres, the way to the realization of complete satisfaction on the part of gas consumers would have been considerably shortened. It has been promptly appreciated that, in the development of the use of gas-furnaces, there is much that is special. These furnaces have to displace old methods; and the efficiency achieved depends upon initial education in all right practices. But the furnace departments of the makers and the experiences of the industrial gas branches of gas undertakings show that the manufacturer is growing less obstinate in his adhesion to custom. This is a change of attitude that helps considerably in the development of gas-furnace work. Confirmation of this statement is found in the paper in which Mr. A. E. Leask, the Sales Superintendent at Leeds, described the furnace demonstration room of the Gas Department, and the work that is going forward there, all of which indicates that every factor in producing success has been taken into account in the work of organization. With what result? The statements in the paper as to the furnaces adopted, and the popularity of even those of considerable dimensions and capacity, supply the answer, as do also these words: "It seems remarkable that up to the present time gas-furnaces have been adopted by every customer who has had a sample of work heat-treated in our demonstration room." This is all excellent; but it is not accomplished by incompetence or indifference. A good operator is employed; the furnaces in the demonstration room have been carefully selected to suit the requirements of local industry; and, not only is proof of efficiency given in the demonstration room, but demonstration and instruction in operation are provided on the consumers' own premises. The efficiency of furnaces, too, has made wonderful progress; and with it improvement in upkeep. Mr. Leask speaks of the number of melts that can be realized before a crucible is disabled. We came across a couple the other day that, before giving up active service, had far exceeded the makers' guarantee. We are with Mr. Leask as to the importance of not holding-up gas consumption tests with laboratory precision as being those that will be realized in daily working. But, on the other hand, working experiences vary so considerably that an injustice might be done to furnaces by adopting, as fairly exemplifying results, those obtained in some factories. We are also with him as to the necessity of making proper pyrometrical observations, and not judging temperatures by colour. The latter is a great mistake, as not only may there be error due to the personal factor, but the condition of the natural light also makes a difference to the observed colour.

Gas Industry and the Chemical Manufacturers.

It will take some time to remove the unpleasant feeling the Alkali Manufacturers' Association created in the gas industry by their attacks on its liberties in respect of internal development and open competition in its secondary products. We should imagine it is quite possible the Alkali Manufacturers' Association will meet its end with the new Association of British Chemical Manufacturers in the field, of which Mr. Charles Carpenter, D.Sc., has been one of the active founders, and is one of the first members. This representation of the gas industry notwithstanding, it was suggested in our columns last week (p. 103) that—for what is one representative among so many of interests that may, to an extent, clash with those of the gas industry!—the National Gas Council should look into the new development to see what, if any, action is requisite in respect of it within the gas industry. Not as the result of this suggestion, but it has an interesting bearing upon it, a message was received by us last Wednesday to the effect that Mr. D. Milne Watson, the Managing Director of the Gas Light and Coke Company, had been co-opted a member of the Council of the Association of British Chemical Manufacturers. Thus the gas industry has two prominent representatives upon the Council of the new body; and the satisfaction is the greater seeing that Mr. Milne Watson's election, in one move, puts upon that Council the Chairman of the Executive Committee of the National Gas Council and the Chairman of the Sulphate of Ammonia Association.

Lists of Employees.

Attention was drawn in the "JOURNAL" three weeks ago to the fact that an amendment had been made of the Defence of the Realm Regulation which requires the posting-up of lists of male employees of military age. The obligations imposed upon employers as then set forth have since been further added to; and employers are now required to prepare three statements furnishing information the nature of which is indicated in the regulation referred to—No. 41A. The first of these is to give (on the existing forms, and, when ready, on others to be officially issued for the purpose) particulars of male employees between 18 and 42 who have been employed for a week or more; the second —which is a new requirement—must show the total number of female employees of any age who have been employed for a week or more, and of male employees so employed who are not within the ages of 18 to 42; and the third is to set forth the male employees between the ages of 18 and 42 (whether still employed or not) who have been employed during the preceding month for less than a week. The first two must be kept posted-up conspicuously; the third need not be. The substance of the amendment previously intimated still holds good—that is, "employers must deliver forthwith to the appropriate Recruiting Officer a copy of each statement which they have to prepare, and in the first week of every calendar month must also deliver to him a written report of alterations and additions down to the end of the preceding month." Exemptions under the order are substantially as before.

Coal Supplies by Rail.

Large consumers of coal who get their supplies by rail will have to keep a sharp look-out on the position of affairs on the railways, in order to ward off, if possible, any surprises in the way of short deliveries. The wagon-pooling schemes and the commandeering of wagons by the Government may not altogether have a beneficial effect on coal supplies, though it would be a dereliction of a great responsibility were the Government to do anything to disturb the free distribution of coal. The "Iron and Coal Trades Review" states that a conference was recently held at the Board of Trade offices, at which a number of representatives of prominent collieries owning a large number of wagons were present; and it was then intimated that the Government would be taking over another 24,000 of their trucks within the next four months in instalments of 6000 a month. The action of the authorities, says our contemporary, can hardly fail to add to the transport difficulties with which the coal industry has at present to contend.

Among the troubles is the shortage of repairing labour, which keeps unduly high the number of cripples out of commission. The "Review" has heard recently of collieries which are unable to work at times for want of wagons, while a quantity of their own are actually on their sidings awaiting repairs.

Dividend of the Gas Light and Coke Company.

We are informed by the Secretary (Mr. W. Beckford Long) that the accounts of the Company for the past half year show that (subject to audit) the balance to the credit of the net revenue account will enable the Directors to recommend the payment of a dividend at the rate of £4 4s. per cent. per annum, carrying forward to the next account the sum of £351,508 14s. 8d.

Gas Industry of the United States.

It having been felt that some steps should be taken to interest the gas men of the State of Texas in the organization of a Gas Association, this was done; and the result has been that the new Texas Gas Association lately held their first annual convention. At this the President (Mr. M. T. Walker) delivered an address, in which, in proof of the claim that the members represent a great and growing industry, he remarked that the census reports of 1910 show the growth of gas business in the United States from 1900 to 1910 to be as follows:

Increase in	P.ct.
Number of establishments	47·8
Value of products	120·3
Amount of capital	61·4
Cost of materials	154·4
Number of persons employed	80·0
Wages and salaries	88·1

Production of Benzene and Toluene.

In an article appearing in the "Journal of Industrial and Engineering Chemistry," Messrs. G. Egloff and R. J. Moore, of Columbia University, New York City, deal with the formation of benzene and toluene from an aromatic base oil—solvent naphtha—at temperatures from 500° to 800° C., at the rate of oil flow of 15 gallons per hour and 11 atmospheres pressure. In the recovered oil, the maximum percentage yield for benzene was 42·5 at 800°, and for toluene 39·9 at 750° C. Upon the basis of 100 gallons of solvent naphtha used, the maximum percentage for benzene was 15·9 at 800°, and for toluene 20·6 at 750° C. The mechanism of the reaction from the thermal decomposition point of view is, they say, the same as of the reaction of aluminium chloride on alkyl derivatives of benzene.

Higher → Lower Alkyl Derivatives of Benzene → Toluene → Benzene

The authors compare the results arrived at with the percentage yields of benzene and toluene from other hydrocarbon oils.

Mr. J. Gibson Newbigging, late Chief Gas Engineer to the Manchester Corporation, who died last October, left estate of the gross value of £9684.

Manufacture of Spelter.—The manufacture of spelter within the Empire has for many years been quite insufficient to cope with the demand for the metal. Stimulated by the war, however, the smelting capacity has been considerably increased; and it may be stated that the Ridge Roasting Furnace and Engineering Company have supplied plant for this purpose to four different smelters. They have just received a repeat order from Messrs. Vivian & Sons, Ltd., of Swansea, for further roasting plant. The fumes are to be used for making sulphuric acid.

Calorific Standard Applications and Orders Made.—Applications are notified by the Local Government Board from the Birmingham Corporation and the Sowerby Bridge Urban District Council for Orders fixing a calorific power standard of 500 B.Th.U. The Board of Trade have received applications, also for standards of 500 B.Th.U., from the Guildford Gas Light and Coke Company and the Ashton Gas Company. They announce that Orders have been made for the Cambridge University and Town Gas Light Company and the Runcorn Gas Company.

Gas Leaks Caused by Artillery Practice.—Mr. D. E. Keppelmann, the General Superintendent of Gas Distribution in the San Francisco District of the Pacific Gas and Electric Company, writing to the "American Gaslight Journal," says that artillery practice at the Presidio, and the impact of heavy motor trucks driving rapidly over its streets, are the greatest causes of leakage in the distribution system of the Company in the Richmond district of San Francisco. The district is adjacent to the Presidio, and is built on what were formerly sand dunes. Directly after artillery practice in the military reservation, a deluge of complaints of leaks is received. The records show that, after a recent artillery practice at the Presidio, at which time all the large guns were used, nearly 500 leaks at joints were uncovered and repaired. The number of leaks in the intermissions between artillery practice is negligible.

OBITUARY.

ANDREW MORTON FYFFE.

DEATH has cut lamentably short a highly promising career, and deprived the gas profession of an exceedingly able member, in the person of Mr. A. Morton Fyffe, the Engineer and General Manager of the Blackburn Corporation Gas-Works. Following on a generally "run-down" condition, he contracted a few weeks ago a chill, which was followed by internal inflammation. Two operations were performed; but from the first it was recognized that his condition was serious, and the utmost care and skill proved unable to save him.

Though no more than 35 years old, Mr. Fyffe had, "JOURNAL" readers are well aware, already done much good work for the industry; and what he had so far accomplished was confidently accepted as an earnest of much more to come. He was son of the late Councillor James Fyffe, J.P., of Dundee, in the Harris Academy of which city he received his early education. Afterwards, he devoted considerable study to the theoretical aspects of his profession at the St. Andrews University and at the Royal Technical College, Dundee, when he was first prizeman in "Engineering." Subsequent to serving his apprenticeship as an engineer, he joined the staff of the Dundee Gas-Works as assistant to Mr. Alexander Yuill, the Engineer and Manager. In 1910, while occupying the position of Chief Assistant Engineer in the Dundee Corporation Gas Department, Mr. Fyffe was appointed Gas Engineer and Manager to the Nelson Corporation, in succession to Mr. A. J. Hope. When thus he left Dundee, after seven years' service with the Gas Department, Mr. Yuill was able to say of him with the utmost sincerity that he had done splendid work at the gas-works; and that he (Mr. Yuill) had a "high appreciation of his ability, not only as an engineer, but for the inventive genius he brought to bear on all problems or work that required concentration of thought and professional ability." While he was at Nelson, the two gas-works there were entirely reconstructed and extended in accordance with his scheme, at a cost of something over £70,000.

The Nelson Corporation retained Mr. Fyffe's services for five years, at the end of which time he was selected from among more than thirty candidates for the post of Gas Engineer and Manager to the Blackburn Corporation (to follow Mr. S. R. Ogden), which appointment he held at the time of his death. The re-organization work which lay before the new Engineer at Blackburn was clearly indicated when the late Sir Corbet Woodall was called in to advise the Corporation; but Mr. Fyffe soon gave evidence, if any were needed, of his ability to tackle the job. Not very many months after his appointment, he presented a report to the Committee setting forth the position of the undertaking and the steps which were immediately necessary to improve the condition of affairs; and in his first annual report he was able to show improved working results. In July last, he submitted a further report, in which he recommended the adoption of a scheme for the reconstruction, at a cost of over £80,000, of the Greenbank Gas-Works of the Corporation—including a large installation of Glover-West vertical retorts, with which system he had previously had highly successful experience at Nelson. The scheme was adopted by the Town Council; but, owing to the war, it was later intimated by the Local Government Board that, though the Board were satisfied that the proposals were desirable and generally satisfactory, the Treasury were not then prepared to sanction the raising of a loan for improving and extending the works, but would sanction the sum required for a tar distillation plant.

As long ago as 1907, Mr. Fyffe was asked by the Monifieth Town Council, acting in the capacity of their Consulting Engineer, to furnish them, in view of the rapidly increasing consumption of gas, with a report dealing with the condition of the works and the necessity for alterations and extensions. On receipt of the report, the Council decided to adopt the scheme proposed by him, and to proceed at once with the first part recommended—involving an outlay of about £2000. This is only one of several similar engagements which he undertook while at Dundee. The realization of his latest and largest scheme he has unhappily not lived to see.

Mr. Fyffe was President of the Eastern District Section of the Scottish Junior Gas Association for the session 1908-9; and he was a member of the Institution of Mechanical Engineers. In the year 1911, he was admitted both to the Institution of Gas Engineers and the Manchester District Institution of Gas Engineers. He was elected on the Committee of the latter Institution twelve months ago; and his death, following so closely upon that of his friend Mr. J. G. Newbigging, has, as Mr. G. S. Frith (the Hon. Secretary) truly remarks, "removed from our midst two very strong personalities in the Manchester District." Mr. Fyffe was unmarried, but had during last year become engaged to Miss Kathleen Nuttall, daughter of the Mayor of Blackburn, who is also Chairman of the Gas Committee.

The funeral service, which took place at Balderstone Church, near Blackburn, last Thursday, was attended by a representative gathering of local gas engineers, including Messrs. E. A. Harman, the President, and G. S. Frith, the Hon. Secretary, of the Manchester District Institution, John Bond (Southport), H. E. Bloor (York), F. Elliott (Leyland), A. J. Harrison (Padiham), Henry Simmonds (Bury), A. H. Smith (Darwen), S. Tagg (Preston), and

Dugald Currie (Nelson). There were also present Messrs. Frank West, Thomas Duxbury, H. Blair, Chesters, and Amos Mitchell. The Blackburn Corporation and the Gas Department were represented by the Mayor and Messrs. J. W. Holgate (Vice-Chairman of the Gas Committee), Lewis Beard (Town Clerk), J. H. Bailey (Borough Treasurer), J. C. Wynne (Assistant Gas Engineer), Thos. Hannibal (Chief Clerk of the Gas Department), C. W. Ward (Works Superintendent), and J. Holden (Distribution Superintendent). Among others attending was Mr. C. Townsley (Mayor of Nelson). A number of employees from the Gas Department assembled as the cortége passed.

AN APPRECIATION BY "A. J. H."

As one who was perhaps the first to make the acquaintance of Mr. A. Morton Fyffe when he came South to Lancashire, I feel it almost a sacred duty to add this appreciation, inadequate though it may be, to his memory. His loss at this time is nothing less than a calamity, both to the gas profession and the borough whose privilege it was to have so recently secured his services. To those who met him frequently, as I did, it was plain to note that for some time there had been a marked change in him, and that his health was not good; but his indomitable spirit kept him to business almost to the last. Even up to the time when it became impossible for him to continue at the desk, and when he must have been suffering most acutely, his keen business capability, his administrative powers, along with his rapid, though sound, method of working, were most marked, and made it, I know, most difficult for his staff to keep pace with him.

There can be no question that he was destined for a much higher position in the profession than even Blackburn, as his engineering ability and business capabilities had been abundantly proved, and he possessed the other attributes which constitute a successful chief—such as irreproachable personal character, gentlemanly demeanour, sound judgment, and tact. It was, indeed, a privilege to be in his company. His unfailing courtesy was appreciated by all; and I know of no one to whom he acted otherwise than as a gentleman. He was brilliant in conversation, showing not only a firm grip of his own particular business, but a general knowledge rarely surpassed.

To those nearest and dearest to him, I am sure the sympathy of the whole profession is extended; and may they derive some comfort from the thought that his manly character, good nature, justness, and uprightness will long remain a most cherished memory with all whose privilege it was to know him as I did.

WILLIAM EWING.

IN spite of the fact that during recent years his name has not been prominent in connection with gas matters, the majority of "JOURNAL" readers will be well aware of the many years of successful work accomplished, in Scotland and elsewhere, by Mr. William Ewing, whose death, following upon a long illness, took place recently in Ireland.

Referring to Mr. Ewing's professional activities, special mention is made of Scotland, because it was there that a great part of his life was spent, and where most of his constructional work was carried out; but he has also been to other places—including Gibraltar, South America, and, as already stated, Ireland. Engagements at Gibraltar and Para were taken up by him after an apprenticeship at the Hamilton Gas-Works; and then, when he had had a spell as Assistant Manager at Londonderry and as Manager at Midleton, he returned, in 1892, to Scotland, and to Hamilton, as Engineer and Manager of the gas-works there. At the end of 1900, after eight years' service at Hamilton, he secured the management of the Greenock Corporation Gas-Works, which he also held for a period of about eight years.

Arising out of the appointment at Greenock there was a legal case, in which a considerable amount of interest was taken at the time; Mr. Ewing bringing an action against the Corporation, in which he claimed £1645 for work done that he contended did not fall within the scope of his duties as Gas Manager. The work referred to—reporting on proposed extensions, preparing plans and estimates, and supervising erection of plant and machinery—was engineering work, which he maintained his salary did not cover. The Judge of the Court of Session by whom the matter was tried, found, however, that Mr. Ewing's undertaking, when he secured the appointment, was that he would, as Gas Manager, have to do engineering work, and that he seemed immediately after his appointment to have assumed the title of Engineer and Manager. In fact, it will be seen from the judgment, which was fully reported in the "JOURNAL" at the time, that the conclusion at which the Judge arrived, after full consideration of all matters relevant to the case, was that the understanding on the part of both Mr. Ewing and the Greenock Corporation was that the work in dispute was fully covered by his salary, and that the action therefore failed.

Mr. Ewing's next appointment, which he took up towards the end of 1910, was as Engineer and Manager to the Lochgelly Gas Company, Limited; and two years later he became Manager of the gas-works at St. Louis, in North Brazil. The announcement made in the "JOURNAL" at the time was that when he left England for South America, he would be accompanied by his son, to act as his Assistant. It seems, however, that his stay abroad on this occasion was not of very extended duration; and subsequently, while far less robust than was formerly the case, he had charge of the Wicklow and Magherafelt Gas-Works. It was, we learn, at the last-named place that he died, when not much more than fifty years of age.

Sergent-Fourrier CHARLES DASNIERES, news of whose death at the front has been received, was well-known by gas managers in this country, upon whom before the war he was in the habit of calling. He was a member of the firm of V. Dasnieres, of Water Lane, E.C. Sergent-Fourrier Dasnieres, was 32 years of age, and had done gallant work with the French Army, for which he had been commended by his Brigade.

The death is announced of Mr. OTTO K. TRECHMANN, J.P., after a long illness. Always an active and greatly respected man in business and public life, he will be much missed in Hartlepool, where he was born in 1854, and with which place he has all his life been connected. In 1905, Mr. Trechmann joined the Board of the Hartlepool Gas and Water Company, and was elected Chairman in 1911. By both staff and workmen his death is sincerely regretted. The new Chairman of the Company is Mr. J. Stanley Appleby, J.P., of Stockton-on-Tees.

PERSONAL.

Second-Lieutenant ROBERT HORNBY PORTER has been promoted to Lieutenant in the 2/4 Duke of Wellington's West Riding Regiment. Lieutenant Porter, who in civil life is Secretary of the Thurso and North of Scotland Gas Corporation, Limited, is the third son of Mr. Robert Porter, the Engineer and Manager of the Elland Gas Company.

Mr. JOHN WHITAKER, Chief Clerk in the Bradford Corporation Gas Department, has completed forty years' service with the Corporation. He entered their employ in 1877, about two years after the gas undertaking was acquired from the Company. The Manager at the time was Mr. David Swallow. There have been quite a number of notable records of long service in the Bradford Gas Department—Mr. Whitaker's and that of the first Manager being prominent among them.

Alderman RICHARD BURTLES, of Heaton Chapel, has been elected Deputy-Chairman of the Manchester Corporation Gas Committee, in succession to the late Alderman Thomas Hassall, J.P. Alderman Burtles, who is the Deputy-Chairman of the Bradford Road Station, was invited to join the Gas Committee in November, 1909, upon the amalgamation of the city with the urban district of Levenshulme. For many years he has been prominently identified with progressive local institutions.

THE EAST LONDON EXPLOSION.

A Large Gasholder Involved.

The terrible explosion on Friday evening at a chemical factory on the north side of the Thames in the East of London, which scattered, with appalling severity, death and destruction far around, happily did not do any damage to gas-works that in any way interfered with the continuity of supply; but one electric supply station incurred a small amount of injury to a switch-board, an effect of which was temporarily noticeable by the electricity consumers in at any rate part of the Company's area. In the direction in which the explosion occurred, there are several important gas-works. One of the companies—the largest—report that their works were not damaged; and a second that no material damage was occasioned to their works, though a couple of the stations suffered a little in the way of broken glass and gauges. One small coal boat was also slightly injured, but not sufficiently to prevent it sailing. The worst happening was in the case of the third company. As the result of the great concussion caused by the explosion, their large 12 million cubic feet gasholder was severely damaged. The escaping gas was ignited, presumably by some lighted particles from the scene of the explosion; but in a very short time it burned itself out, without doing any serious damage to people close by or adjoining property. There was at the time about 7¾ million cubic feet of gas in the holder, with four of the six lifts cupped. The supply of gas was maintained throughout at normal pressure. Upon this, while deeply regretting the accident, we congratulate the Company.

At a meeting of the Midland Section of the Coke-Oven Managers' Association, next Saturday, Prof. W. G. Fearnsides, M.A., of Sheffield University (where the meeting will be held), will read a paper on the "Natural History of Some Coke-Oven Bricks."

There is, according to arrangements made at the meeting at Newcastle-on-Tyne last month of the Provisional Committee, to be at an early date a general meeting of the Refractory Materials Section of the Ceramic Society, when a paper will be read by Dr. J. W. Mellor on the "Spalling of Magnesite Bricks." The meeting will take place in Leeds.

GAS INSTITUTION "TRANSACTIONS."

THOUGH following the arrangement of the previous year in so far as limiting the annual meeting to one day was concerned, the proceedings at the gathering in London last June of the Institution of Gas Engineers were not confined to a morning session, but, it will be remembered, extended also over the afternoon. There was thus opportunity for a good deal of discussion on the various reports presented—papers were once again altogether absent from the *agenda*. These reports, with the address of the President (Mr. John Young, of Hull), the remarks of the different speakers, various particulars in connection wifh the Institution, and much other information certain to prove of interest to the reader, have now been reprinted in the volume of "Transactions" for 1916, edited by Mr. Walter T. Dunn, F.C.I.S. (the Secretary).

After a frontispiece which will be appreciated by the members, as representing both a good friend and a genial President, there follows the Institution Roll of Honour, in which are to be found a number of names well known and as greatly respected in the gas industry. The asterisk denoting that a life has been given up for the country, appears on this occasion against one name—that of Mr. Charles V. Townsend, who was Engineer and Manager of the Hereford Corporation Gas-Works, and a son of Mr. Harry Townsend, of Wakefield, with whom in his sorrows (unhappily not confined to the loss of the son here mentioned) so much sympathy has been felt. It is earnestly hoped that the military efforts of the coming campaign, upon which the attention of the world is already fixed, will not result in the adding of further asterisks to the Institution Roll of Honour. Apart from the war, the memoirs appearing in the volume constitute a record of the good work of, alas! quite a large number of deeply mourned friends—including Sir Corbet Woodall, Mr. William Ford, and Prof. Vivian B. Lewes.

With regard to the reports presented at the meeting, there is no need to add anything now. The subjects dealt with, and the manner of their treatment, will still be in mind. Following these, there is reprinted, with the permission of the Joint Committee of the International Gas Congress held in San Francisco, in the autumn of 1915, the contribution to the proceedings made by the Institution. The title of this is "A Review of the Present Practice in the Manufacture, Distribution, and Sale of Gas by British Undertakings;" and it consists of an introduction by the late Mr. Edward Allen, of Liverpool, and papers by Dr. W. B. Davidson, Mr. J. Ferguson Bell, Mr. Walter Hole, and Mr. F. W. Goodenough. Pressure of duties connected with the war prevented Mr. John Bond from preparing the paper that he had intended to contribute. The remaining section of the book is devoted to what has been recognized as a very useful feature on previous occasions—namely, concise abstracts of papers which appeared in various chemical journals published during the twelve months ended last June.

From what has been said, it will be seen that the volume will prove a useful acquisition to the gas man's library.

ELECTRICITY SUPPLY MEMORANDA.

DESPITE the almost universal increases in the prices of electrical energy, many undertakings owned by local authorities show a distressed condition for the last financial year; and not a few will be in worse plight still in the year through which we are now passing, although charges for current have been further augmented. It is no uncommon thing now to find electricity undertakings that have increased their pre-war charges by 30 p.ct. or more. Take two examples: Aldershot has advanced its flat-rate from 4½d. to 6d. per unit, *plus* 10 p.ct. for lighting; and power and heating are now charged at 3d. to 2½d. instead of 2d. to 1½d., *plus* 20 p.ct. These advances are considerably above 30 p.ct. Take Southwark, again, the Electricity Committee have in contemplation additions to the charges which will make them for lighting 30 p.ct. over pre-war prices, and for power 50 p.ct. The consumers in the area have also something further to which to look forward, from Jan. 1 next year. From then they will not know exactly where they are, inasmuch as the charges are going to be advanced by 1 p.ct. (without any further notice) for each 6d. by which the contract price for coal may exceed 20s. per ton, on all accounts issued after Jan. 1, 1918. We do not know what the Southwark Borough Council are paying for coal now; but we have a suspicion that, if the new rule were applied at once, there might be a few sixpences demanding their 1 p.ct. apiece. It is noticed that, in the last report of the Electricity Department of the neighbouring Borough of Bermondsey, it is stated that coal accounts for an extra expenditure of £4922 for the year. Gravesend reports that the average cost of fuel in the last financial year was 29s. per ton, compared with 18s. 3d. per ton formerly. Ipswich gives the information in its last annual report that, while the units sold during the year increased by 26 p.ct., the cost of coal advanced by 84 p.ct. These are serious figures; and they by no means tell the whole tale. Wages are going up, where there are men to pay; and there are stations here and there where they are extremely short-handed. At one within knowledge, the assistant engineer is engaged in the healthy occupation of stoking. The other day at Colchester the Chairman of the Electricity Committee (Alderman Barritt) stated that the conditions under which electrical current was now being generated and distributed were much more serious than formerly, and might become critical. These conditions were caused by the decrease in the staff; and he had some fear that it might be necessary to temporarily suspend the supply of current. There are not many concerns so hard-driven to it as this; but there are a good number that involuntarily have had suspensions of supply owing to over-pressed plant, through the demands for power for munition work. With gas-supply plant and its storage, there is greater elasticity and safety; and production can be pushed well up without any chance of breakdown.

Trading Results.

Sample Deficits.

Albeit the additions to charges for coal and other materials and wages, depletion of staffs, and other conditions that do not make for economy, there is the prediction that the current financial year will see worse debits for many undertakings than the last one. And this was bad enough. Just running down the news columns of an electrical paper for recent weeks, there are seen some specimens of how electrical undertakings, under diverse circumstances, have been hit. There is Barking showing a deficit of £2997; Barnsley one of £363; Barnstaple, £1639; Bath, £150; Ealing, £3038; Eastbourne (only six months' working), £2100; East Ham, £3424; Edinburgh, £8075; Gloucester, £2056; Kingston-upon-Thames, £629; Newport (Mon.), £993; Peterborough, £471; Wimbledon, £2525. Bradford supplies a prominent illustration of how, with a large increase in income, the net profit is actually less than the year before. The total income from all sources during the year increased by £19,438; while the additional expenditure to be placed against this was £15,477, which gave a balance to the good of some £4000. But interest, sinking fund, and income-tax had also soared up, with the result that the net profit was £15,988, against £18,956. If anyone asked us to say from memory which electricity undertakings had not increased their charges during the war, we should only like to speak with confidence (up to our last information) of Bradford.

Mr. Horace Boot and Gas Heating.

Mr. Horace Boot has been speaking the truth regarding electric heating; and "Meteor" asks: "Is this Apostasy?" Surely not. He goes on to remark: "Most of us are convinced that not only is electricity superior and safer; it rejoices also in several other advantages." We do not for one moment doubt the existence of these "convictions" among a number of electrical men with electrical current for sale. It seems that Mr. Boot has found a lack of knowledge of electrical affairs among borough engineers and surveyors; and so he engaged in a little piece of missionary enterprise by expounding the electrical gospel, except in the one part, at a meeting of the Institution of Municipal Engineers. Among the advocacy was that electricity should be used for street lighting, and indeed for lighting generally. We do not know why, seeing that economy, reliability, penetrative power, lower intrinsic brilliancy for a given illuminating power, and so forth, are on the side of gas. But Mr. Boot's bombshell is found in the words: "With regard to heating by electricity, the same does not apply; and unless the rooms are confined and badly ventilated, gas heating is cheaper than electricity, and more satisfactory for municipal buildings." That is excellent and truthful testimony from an electrical engineer, though it wants a little amending. Where rooms are badly ventilated, the gas-fire, like the coal fire, is an aid to the improvement of the ventilation, seeing that air must be drawn into the room through various inlets, and air must be ejected out of the room *viâ* the chimney. In this way, the air of the room can never become stagnant as would be the case in a room where an electric radiator is used. Physiologists tell us that the movement of air in rooms is a condition necessary to a heathful existence.

American Testimony.

The testimony of users of electric radiators and other forms of electric-heaters supports Mr. Horace Boot. Fitters of gas-fires have become quite expert at displanting electrical forms of heaters, and putting in modern types of gas-fires. Electricians, if they cared or dared to do so, could tell a tale of bitter disappointment; but it is altogether beyond human endurance that, in such a climate as this, the householder should put up with a type of heater that has not the capacity for meeting requirements day by day, no matter the atmospheric conditions. Testimony comes from America. The "Electrical World" speaks out fearlessly. It claims that electricity for any purpose, particularly for house-heating, is ideal—if. A chimneyless city, it says, is a consummation devoutly to be wished; "but, alas! we fear, never to be realized except in sunny climes where winter is unknown, and where the inhabitants are as anxious to rid themselves of heat as we are to get it." That is to say—where heaters, electrical or otherwise, are things that can be done without, there is the only place where electrical heating stands a chance. We will not try to elucidate such an anomalous position. There is greater interest in the practical confessions that follow. Coal, it is admitted, at $10 a ton is a cheaper source of heat than electricity at $10 a

kilowatt-year; and central station managers are invited to face the fact. Later on in the article, our contemporary emphasizes its contention in these passages: "A wide field exists for portable electric-heaters which are used intermittently when severe cold does not obtain, and for removing chill from the atmosphere of rooms. But, except in rare cases, there is no field for a system of electric house heating to replace standard forms now in use, employing coal, with coal at present prices." The "Electrical World" does not say anything about British makes of gas-fires, and experiences with them at normal prices of gas in this country. Prior to the war, and since, the demands for gas-fires have caused some embarrassment to many gas undertakings here, owing to the run on supplies, and the difficulties of obtaining a sufficient number of experienced men for the installation work. The latter difficulty has resulted in considerations as to rent and fitting costs being offered to householders who give instructions for fires to be fixed during the summer and autumn.

How to Sell Electric Cookers.

Electricians have an exceedingly high opinion of the value to them of human credulity. Some of them are talking now as though initial and installation costs for electric cooking apparatus are of comparatively small moment, if they can only get people to look at the matter from the same standpoint as themselves. The writer of "Cooking and Heating Notes" in the "Electrical Times" has rather been attracted by what he calls a "spirited article" that has been contributed to the "Electrical Review" of Chicago by Mr. Bullard. He thinks that electrical people ought to strive to sell "cooking service" rather than the apparatus itself; and he holds that low initial cost is less important than efficient salesmanship and advertising. Also that it matters not at what price an electric range is sold if it does not give satisfactory service; and until prospective users can be persuaded that electric cooking is the best, the sale of ranges will not increase to the satisfaction of the manufacturer, the dealer, or the central station. Since rates offered for cooking are, he says, now as low as it is wise to make them, it is unfair to burden with any unnecessary expense the revenue from energy sold for this purpose. Mr. Bullard would have more reason to say this if he took the rates for cooking that the electricity industry on this side finds it necessary to charge in competition with gas supply. It is further pointed out that most central stations and many dealers in the States are able to supply electric-cookers on terms similar to those offered by dealers in pianos, sewing-machines, and gramophones. But Mr. Bullard is particularly out for an advertising campaign. This is how he would meet the cost. He would have the poor souls who engage to purchase cookers on "easy terms" pay in the long-run a considerably increased cost for them, so that a liberal percentage of the revenue could be set aside for the purposes of a national co-operative electric cooking advertising campaign. He is ardent enough over electric cooking to believe that such a campaign would cause people really to desire to cook with electricity. He is optimistic. "Such a plan would prove far more advantageous to all concerned than the low-priced scheme. The central station would benefit by the absence of dead capital charges on which interest must be paid, and thus tend to keep up tariffs. Manufacturers and dealers would benefit by increased sales at reasonable profits. The consumer would benefit also." How? By paying the costs of the advertising campaign? By paying the costs of cooking, including all boiling operations, by electricity instead of by a cheaper heat-producing system? However, the idea is that the electricity supply industry must look more and more to extensive advertising and intensive salesmanship rather than to the selling price to develop the demand for electric cooking apparatus. We believe there are other factors that tell—efficiency and reliability of apparatus, and an over-all working economy. Advertising and intensive salesmanship are not always truthful; and they certainly do not demonstrate actualities. Turning to our own British "Electrical Review," we find a *résumé* of a paper also of American origin; and, in the *résumé*, there is this reference to first cost: "We notice that the author avoids all reference to the first cost of apparatus, which is a greater obstacle in this country than the cost of energy to the general adoption of electric cooking, and, judging by opinions of American central station men (set forth in the report of the Electric Range Committee of the National Electric Light Association) is not without influence on progress in the States."

Inter-linking.

Since our last reference to the progress of the linking-up campaign, very little of a tangible nature has been done. Christmas, with its obligations and other attractions, has intervened. A Committee has been formed for Yorkshire, under the chairmanship of Mr. Thomas Roles, the City Electrical Engineer of Bradford. In the county, there are forty electricity supply undertakings, thirty of which are municipally managed. So far the Committee are engaged on the prosaic work of obtaining information. Much the same sort of thing is being done by a Committee appointed for the West of England, in which area it is not thought by Mr. H. Faraday Proctor, of Bristol, that much can be immediately done in actual inter-connection. A question has been raised as to the outlook for the smaller undertakings. It has been fancied that inter-linking means the beginning of the absorption of such concerns. But Mr. Proctor (who is Joint Honorary Secretary to the National Electric Power Supply Joint Committee) says that the question had early consideration; and it was laid down by the Joint Committee: "That, in formulating any linking-up proposals, existing areas and rights should be preserved." As a matter of fact, the Joint Committee are of opinion that the output of the smaller undertakings will be much improved. A further Committee has been appointed for the North-East Coast concerns, with Mr. A. S. Blackman, of Sunderland, as Chairman.

The Coal Tar Tree.

The "Electrical Times" has just discovered the "coal tar tree;" and it has reproduced it on a small scale. It is in diagrammatic form. "Meteor" says "it shows the great importance of coal tar; and many of the branches affect the station engineer." This is a remarkable discovery. The "great importance" of coal tar was shown by a coal tar tree in the days of our youth; and it was then a much admired companion. The reference to many of the branches affecting the station engineer is perhaps another way of saying that all the branches affect those among them who are envious of the more economic use of coal by gas undertakings than by the electricity generating stations. Or "Meteor" may have had his eye on coke, which is a means favoured by some electrical engineers of heating water for domestic use—electrical engineers who have not elephantine hides, and so do not care to meet irate deluded users of water-heating apparatus heated electrically. Or perhaps he has his eyes upon fuel oils, or sal ammoniac, or may be aspirin or phenacetin. But there, it is no good questioning as to what was in that profound mind of "Meteor." We are grateful that he recognizes the "great importance" of coal tar, as this means that he begins to appreciate the fact that the gas industry has something besides gas contributing to the stability and security of its foundations. However, the publication of the coal tar tree will carry enlightenment to many dark places in the electrical industry.

Parliamentary Applications.

There are only some half-a-dozen Bills associated with electricity being promoted in the ensuing session of Parliament; and some of these concern tramways. The Blackpool Corporation are asking for an extension of their electrical supply area. The Ebbw Vale District Council want larger powers to do business in electrical fittings and apparatus. No doubt the Electrical Contractors' Association will keep an eye on this move. A Bill is being promoted by the Sheffield Corporation with the objects of utilizing lands now belonging to them at Rotherham for the erection of a new generating station, and of laying electric lines and constructing a wharf on the west bank of the River Don. It is also in contemplation to extend the borough so as to include a portion of the parish of Rotherham, and to authorize the supply of electrical energy within the added area. A dozen Provisional Orders are also being promoted, nine of which are the children of the Electrical Distribution of Yorkshire, Limited. It will be remembered that the Company were a time ago in Parliament asking for special and comprehensive powers in respect of the supply of electricity for lighting purposes. They practically wanted a free hand without being controlled by certain of the general enactments applying to electricity supply for lighting purposes. Parliament refused to confer any preferential powers upon the Company, who are now setting to work to enlarge their sphere of operations by promoting separate Orders for different areas. The present Orders refer to: (1) Clayton and Queensbury, (2) Featherstone, (3) Garforth, (4) Horbury, (5) Luddenden Foot, (6) Otley, (7) Penistone, (8) Rawdon and Yeadon, (9) Wortley Rural District—including Bradfield, Ecclesfield, and Tankersley. The proposals are most likely to meet with considerable opposition.

Roasting Coffee by Means of Gas.

An article published in the "Natural Gas Journal" (U.S.A.), under the title of "Gas Roasted Coffee," shows that the use of gas for this purpose in the United States is now by no means unimportant. During the last fifty years, the annual consumption of coffee in America has nearly doubled, having advanced from 5¾ lbs. per head in 1854 to 10¼ lbs. in 1913. This natural increase has tended to develop the industry on more scientific lines. Coffee merchants in all parts of the country were practically unanimous in favour of gas fuel for roasting; the shrinkage being less, and the roast developed at a lighter shade, than with coal or coke. At Houston, Texas, the International Coffee Company have a six-burner plant, capable of turning out 3600 lbs. per hour, with greater dispatch and certainty than is possible with solid fuels. The total product from the plant during 1915 was more than 2,000,000 lbs.; the consumption of gas in the twelve months being nearly 2,000,000 c.ft. A smaller plant (only four burners) belonging to the same Company used more than 1,000,000 c.ft. of gas the same year. The Magnolia Coffee Company possesses a six-burner set, in which the consumption was nearly as much; and two other coffee companies consumed more than 500,000 c.ft. A feature in this line of business is that, like cooking, the consumption is fairly regular throughout the year.

Among the papers down on the programme for presentation at the ninth annual meeting (held in New York City earlier this month) of the American Institute of Chemical Engineers was one by Mr. C. J. Ramsburg, on the "Recovery of Benzol from Coke-Oven and Illuminating Gas."

THE TALE OF COAL AND COKE EXPORTS.

Reduced Business and Increased Values.

THE issue of the Board of Trade returns for December completes the tale of the coal exports for the year 1916. It is a singular tale in some respects; and nobody seems particularly pleased with it, excepting the not unimportant body of home consumers, who see in it a certain amount of protection of their supplies. With the price of coal for home use regulated up to a point—that is to say, regulated by the Board of Trade so far as they are able to be a match for those of the coalowners who are not submissive to the fiats of the powers that be, and who make uncommonly light of the penalties instituted, which have just about as much effect on them as a "Trespassers will be Prosecuted" notice has upon the farmers' feathery enemies—and with (save lately in the case of France and Italy) freedom of price for supplies abroad, the owners have been vehemently execrating the conditions that have made for the curtailment of their foreign business, such as the sharp control over export licences and the shortage of tonnage.

But while authority has limited licences, and largely reduced tonnage has curtailed shipments, there has been a cry as to the revenue of the country suffering from reduced contribution from coal exports, and as to the quantity of coal available for export not being what it should be to provide a basis of negotiation of a reciprocal character with neutral countries. There has been an amount of fiction about this; for it is no use having additional coal available for export if there are not ships to carry it. Moreover, Mr. Runciman (the ex-President of the Board of Trade) not very long since admitted that there were collieries working short time, due solely to insufficient tonnage; and he urged large home consumers to stock more freely, so as to absorb the output of these collieries. Since the statement was made, a paper circulating in one of the coal areas has announced that the Treasury has arranged to come to the aid of the coal business, the activity of which has been greatly lessened by the difficulty of transport. The means to be adopted (so it was stated) are that the Government will buy at a fixed price all coal left over at the pits through the impossibility of transport, and will make grants to ensure an increase in the outputs of the mines in general. This all points to an amount of fiction being scattered over the former attitude of the Board of Trade and the coalowners in respect of shortage of supply, and in regard to the other elements in their case for the need of a larger economy in home consumption in order to release more coal for export. The economic aspect of the matter is not found solely on the side of exports; there is the economic aspect which affects this country in another way. How does it economically benefit this country for the coalowners to realize more profit from the export business, if, by so doing, its own industries have to be starved for fuel, and so unable to work to full producing capacity? Sight has been lost—conveniently or inadvertently—of the fact that there are other economic considerations than those that have been put forward by the Board of Trade, and tenderly nursed by the coalowners and their faithful supporters.

THE SHOWING OF DECEMBER.

While, however, exports have declined very considerably, there is no cause for regret over the financial issue of the reduced export trade during the past year, other than that part of it represents a heavy tax upon our Allies which they can ill-afford. But before giving the figures which disclose a remarkable tale, we may just refer to those for the month of December. Although 1913 boasted a record coal trade, the month of December that year only showed shipments amounting to 3,229,453 tons. The exports last month aggregated 2,612,343 tons. So that, compared with December, 1913, there was a reduction of 617,110 tons. The final month of 1914 saw 3,698,874 tons sent abroad, and that of 1915 3,287,242 tons; so that last month's shipments represented a decrease of 1,086,531 tons on December, 1914, and 674,899 tons on December, 1915. In 1913, following on the coal strike, values were high; and the quantity of coal exported in December that year had an aggregate value of no less than £4,329,267. The value for December, 1914, was £2,466,008; for 1915, £2,918,087; and for 1916, £3,265,080.

REDUCED EXPORTS AND INCREASED VALUES DURING THE WAR YEARS.

In 1913 there was a record shipment—73,400,118 tons (excluding bunker coals); and, as already intimated, values were high. For this volume of business, the value was £50,727,252. When we come to place the figures for 1916 alongside these, we see a truly remarkable state of affairs. The shipments last year were 38,351,553 tons—a reduction of 35,048,565 tons on 1913, or upwards of 47 per cent. But the value was £46,386,297, or only £4,340,955 short of 1913, notwithstanding the reduction of 35,048,565 tons in volume. Comparing the three years which have been wholly or partly affected by the war, we see the gradual recession in quantity exported, while the values have increased enormously. In 1914, 59,039,880 tons were exported; the value being £39,862,008. Last year the export of 38,351,553 tons was 20,688,327 tons less than in 1914; but the value, £46,386,297, was £6,524,289 more. Shipped coal in 1915—43,534,560 tons—was less than that of 1914 by 15,505,320 tons; but the value (£36,391,690) was only £3,470,318 less. Last year's figure of 38,351,553 tons showed a shrinkage upon 1915 of 5,183,007 tons; but the value, being £46,386,297, was more by £9,994,607.

GAS COAL EXPORTS.

Of the total exports last year, 6,469,402 tons were classed as "gas coal;" and the value was £6,730,296. In 1913, 11,527,686 tons of gas coal were sent abroad; the value being £7,154,427. In other words, with a reduction last year of 5,058,284 tons, there was a diminution in value of only £424,131. In 1914, 10,080,243 tons of gas coal were shipped; the value of it being £6,251,592. Therefore, last year, with its exported quantity of 6,469,402 tons, and its value of £6,730,296, saw, compared with 1914, an augmented value of £478,704 for a quantity reduced by 3,610,841 tons. In 1915, 7,274,649 tons of gas coal were sent from our shores; the value being £5,051,345. Thus last year showed in contrast with 1915 a decline in quantity of 805,247 tons; but an increase in value of £1,678,951. On these figures we calculate the average values per ton at: 1913, 12s. 4·95d.; 1914, 12s. 4·84d.; 1915, 13s. 10·65d.; 1916, £1 0s. 9·67d. That is to say, an average of 8s. 4·72d. per ton more was obtained last year than in 1913. The end of last year showed a tendency, notwithstanding the regulated prices to the Allies, to an ascent of values—the average value per ton for December being £1 1s. 10·76d.

COKE EXPORTS.

There was some feeling a time ago among gas undertakings engaging in a coke export trade regarding the withholding of licences for the shipping of coke; but the returns for last year show a larger quantity exported than in any year since and including 1913. Last year 1,481,498 tons of coke were sent abroad; the value being £2,504,185. In 1913, 1,235,141 tons were exported; the value being £1,149,822. Thus last year saw 246,357 tons more coke go out of the country than in 1913; but the increased value for the year was £1,354,363—not by any means a bad showing. The amount of coke shipped in 1914 was 1,182,848 tons; the value being £945,909. The quantity sent out in 1915 was 1,010,713 tons, with a value attached of £1,173,642. Comparing the 1914 figures with those for 1916, the latter year saw an increase in the volume of trade of 298,650 tons, and an augmented value of £1,558,276. Contrasting 1915 with 1916, the latter year had an increase in quantity of 470,785 tons; and an advance of £1,330,543 in money value. The comparative figures for the month of December are: 1913, 118,619 tons (value £104,752); 1914, 107,442 tons (value £81,347); 1915, 101,168 tons (value £142,648); and 1916, 96,080 tons (value £178,126).

Although the volume of the export coal business has shrunk so considerably through necessity and ungovernable circumstances, there is nothing of which complaint can be made in respect of revenue production both for coal and coke.

TRAINING OF EMPLOYEES.

In the course of a report presented at the Atlantic City convention of the National Commercial Gas Association, Dr. Lee Galloway, the Director-Chairman of the Board of Education Control, remarked that progress in any industry cannot move faster than the ability of the employees to carry on the production, sales, and accounting activities with loyalty in their hearts, co-operation in their methods, and intelligent judgment in their work. None of these were ever introduced into a works by ignorance, indifference, or egotism; no successful gas plant was ever erected out of unsuitable and disintegrating materials; and no organization could be built up from destructive elements. Loyalty could only follow worthy motives, co-operation come as a result of broad-minded policies, and judgment with intelligence by constant and continuous watchfulness over the kind of information assembled for the use of the employees, and the means adopted to impart such knowledge. The course of training prepared by the National Commercial Gas Association was intended to emphasize the true basis of loyalty and co-operation, and to prove a sure means of developing the working intelligence of employees in the commercial department of a gas undertaking; and such qualities could not be established without proper training and knowledge.

There was no greater fallacy in the minds of employees than that promotion, position, and salary had no necessary connection with ability, integrity, industry, and business training; and it was due to the ignorance of the true relationship of these qualities to success. They naturally place the blame for their slow progress on superior officers rather than on themselves. They have never studied the problem of their position, do not realize how much must be learnt before they are fit to take real responsibilities, and therefore believe that success comes through luck or favouritism. They grasp the nature of skilled employment, and are unable to distinguish between the requirements of the skilled as compared with the unskilled job.

When developing a gas property, the best expert advice was applied to the physical and commercial conditions; but with regard to the development of the employee—the greatest asset in any large business—this was entirely neglected, or possibly the manager might suggest to the salesmen the desirability of devoting spare time to improvement in knowledge. The manager excuses failure or poor results as due to indifference, carelessness, or incapacity, and does not realize that the human sales organization

requires the constant supervision and improvement that is commonly bestowed on the plant and works. If this falls short of the expected results, he does not blame the machinery, but searches for the cause. If he worked all day as a fireman, and looked after the management of the works in his spare time, he would not expect the best results; and the training of the employee was not incidental to, but the very heart and soul of, a sound commercial policy.

THE ORGANIZATION OF TRADES.

THOUGH the question of first importance just now to this country and to our Allies is the winning of the war, there are others for the dealing with which it is none to early to make active preparation. If the existence of the Empire depends in the first place upon the ability of its people to defend themselves when assailed, it is dependent in little less degree upon the successful maintenance of commercial conditions. Therefore, the latter aspect is one which nobody can afford to ignore. Those in the best position to judge see in the future a keen trade war which will need much energy and efficient organization to victoriously wage; and any steps which can now be taken may well be worth twice as much as the same effort made later on.

The subject of the "Organization of Trades" was dealt with at considerable length by Mr. Ernest J. P. Benn, when addressing the London School of Economics last Thursday; and the lecture contains just what students of the question are on the look-out for—that is to say, suggestions for a satisfactory and lasting solution of "the gigantic problem of our trade, with all its details, all its complications, and all the vast national and international interests involved." In short, Mr. Benn's object was to plead for the organization of all the trades of the country in such a way that the three parties who are interested—the State, the workman, and the capitalist—may be able together to develop them to their fullest extent; and the suggestions which he had to put forward for the attainment of this end were: (1) That the State shall recognize its duty in connection with the promotion of trade; (2) that duly elected public bodies shall be created, charged with the responsibility of caring for each trade; and (3) that both employers and employed shall be represented on these bodies. "There are," said Mr. Benn, "28,678 local authorities in the United Kingdom to attend to sewers, cemeteries, street lights, and other such details. Surely, trade is worth at least as much attention."

The basis on which the lecturer builds is the trade association and the trade union. He would have every manufacturer in a given trade a member of the trade association; he would require that all workmen and workwomen in the trade become members of the trade union; and from the two bodies he would construct a trade council, to which the Government would give a status and responsibility, placing it in much the same position as a local governing body. Out of these numerous trade councils, he would elect a national trades council; and, presiding over this, he would place a member of the Government specially responsible for the promotion of the trading interests of the country. The most important work that would fall to the lot of the trade councils would, he declares, be in connection with the application of science to trade.

Tar-Oils for Diesel Engines.

A general statement of the work carried out in 1916 was made by the Hon. Secretary (Mr. Percy Still) at last month's meeting of the Diesel Engine Users' Association. In the course of this, he said that a considerable amount of attention has been given during the year to the subject of the use of tar-oils as fuel in Diesel engines. In view of the high price of imported fuel oil, and of possible shortage in the future, consequent on the conditions brought about by the war, much stress has been laid on the importance of encouraging in every possible way the use of a home product as fuel. As a result, several members of the Association have already commenced to use tar-oils in their Diesel engines, either with pilot-ignition apparatus fitted to the engine or without; and a considerable amount of useful experience has been obtained in the use of this class of fuel. Further trials are still being made with various methods of using tar-oil; and several members are awaiting further information on the subject before placing orders for tar-oil. Certain difficulties in connection with the use of tar-oil have to be met; but there appears to be no doubt that, if such fuel can be supplied to a suitable specification in various parts of the country at a reasonable price, Diesel engine users would soon make the necessary arrangements for its use, either wholly or partially, in place of the imported product.

In consequence of his acceptance of office as President of the Local Government Board, Lord Rhondda has resigned the Chairmanship of the Committee appointed to consider the position of the coal trade after the war, especially with reference to foreign competition. The President of the Board of Trade has appointed Mr. Adam Nimmo to succeed Lord Rhondda. Mr. Nimmo is a Scottish coalowner, and Chairman of the Mining Association of Great Britain.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Meeting at Leeds.

Members of the Yorkshire Junior Gas Association gathered on Saturday at the Dewsbury Road Gas-Works of the Leeds Corporation to hear a paper upon "Town's Gas for Industrial Furnaces," by Mr. E. A. Leask, the Sales Superintendent of the Leeds Gas Department. The PRESIDENT (Mr. J. Lister Cooper) occupied the chair; and there was a very good attendance.

The PRESIDENT congratulated the members upon their attendance in view of the heavy pressure of work upon the craft and of particularly bad weather. He wished to express the appreciation of the members in respect of the presence of Mr. W. B. Leech, the Leeds Corporation Gas Engineer.

Mr. LEECH, in welcoming the Association to Leeds, said the matter of town's gas for industrial furnaces was particularly important at the present time—though it was, under normal conditions, a matter of vastly increasing import. It was an ill wind which blew nobody any good; and this was one of the things in which gas undertakings—badly hit in some other directions—had derived benefit from the war. It had given the Leeds undertaking an opportunity of extending its sources of consumption. They, like all other gas undertakings, had suffered much from some loss of illuminating power owing to the extraction of toluol. The British workman, employed or employer, was, whatever his political views, very conservative in his habits; and to introduce something new to him was a difficult proposition. He preferred to hold on to the things he knew, and from which he had hitherto made a sufficiently good living. Now, however, industries were bound by the war to put in gas-furnaces; and he (Mr. Leech) felt sure that they would never wish to go back on them. The Leeds undertaking had made great efforts in developing this department for application to the Leeds industries requiring furnaces, and had had the satisfaction of seeing its output of gas for this purpose increase very considerably. For the year 1914, the output of gas for the purpose had been 5,750,000 c.ft. The effect of the fillip given by the war was evident in the figures for the succeeding years; the 1915 output having been 48,000,000 c.ft., and that of 1916 156 millions. The development of the furnace gas, therefore, had reached a figure which just about made up for the loss in street lighting and other ways.

Mr. E. A. LEASK then read the following paper:

TOWN GAS AND INDUSTRIAL FURNACES.

On receiving the request to read a paper before this Association, it occurred to me that the subject of "Gas-Fired Furnaces" would be appropriate at the present time, in view of the recent developments which have taken place in the use of town's gas for industrial purposes.

I propose to describe briefly the Leeds Furnace Department, and point out some of the methods which I have found to be successful in promoting sales. I have before me some samples of work which have been heat-treated by gas; and after the reading of this paper, you will have an opportunity of examining the furnaces in the demonstration room and observing the various heats which can be obtained.

DEMONSTRATION ROOM.

It was some months prior to the commencement of the war that Mr. Leech agreed to have a permanent exhibition of gas-fired furnaces in Leeds; and steps were taken to provide suitable premises. Unlike a show-room for gas-fires and ornamental gas-fittings, where carpets and easy chairs are provided for the comfort of customers, it was only necessary to have a well-ventilated building of ample size, and a concrete floor. The premises selected in Dewsbury Road are in close proximity to many of the engineering works, and had previously been used as a store for gas cooking stoves, &c.*

The dimensions of the demonstration room are as follows: Length 42 ft., width 29 ft., height to eaves 17 ft. 6 in., height to ridge 27 ft. 6 in. A bench is provided in the centre of the room upon which the smaller furnaces are fitted. The larger furnaces are fixed at a distance of 6 ft. from the walls.

Adjoining the demonstration room is a workshop, where furnaces may be relined and repairs and alterations carried out. At the doorway of this workshop, lifting tackle is provided for loading and unloading the goods. This is necessary, as many of the furnaces are very heavy; some being as much as from 3 to 4 tons in weight.

The air-blower has a capacity of 4000 c.ft. per hour and may be worked up to a pressure of 6 lbs. per square inch, a 3-in. air-pipe being carried round the room and T-pieces fitted at short intervals for connecting to the furnaces. The blower is driven by a 4½ B.H.P. gas-engine. Low-pressure gas is supplied by a 4-in. service and 300-lt. test meter; and any furnace may be accurately tested for gas consumption. A 3-in. W.I. gas-pipe is fitted round the room in a similar manner to the air-pipe, and is painted a distinctive

* A photograph of this demonstration room will be found in the "JOURNAL" for Oct. 3 last, p. 20.—ED. "G.J."

colour. High-pressure gas, at 3 lbs. pressure, is also provided, and may be used when required. The pressures of gas and air are indicated by a set of gauges, graduated to show inches of water and pounds per square inch.

In selecting the furnaces for demonstration, consideration was given to the requirements of local industries; and it is satisfactory to note that every type of furnace shown in the room is now in use on the district. Since the furnace room was opened, it has proved a very great service to local manufacturers, as, in addition to affording a means for inspection and demonstrating the usefulness of the various types of furnaces, the fact of being able to deliver as it were from stock has been the means of selling a great number of furnaces, and accelerating the production of munitions.

Temperature Measurement.

The importance of conducting furnace operations at definite temperatures is now fully realized by manufacturers. The colour scale, where dull red is regarded as 700° C., bright cherry red 1000° C., and white 1300° C., is not at all reliable, as no two persons form quite the same judgment of the colour. For taking correct temperatures we have two portable pyrometer sets of the thermo-electric type. One instrument will indicate up to 1400° C. The thermo-couple is placed inside the furnace, and is connected to a galvanometer, which may be placed in a convenient position in the room. The action of the heat upon the thermal junction develops an electric current which deflects the needle of the galvanometer as the temperature rises; the amount of deflection indicating the temperature upon a graduated scale.

The second instrument is of the radiation type, and indicates up to 1700° C. This pyrometer is exceedingly useful for all high temperature work, and is not subject to the deterioration which must take place in any instrument which is heated in a furnace. The image of the source of heat is focussed upon the thermal junction, and the rise in temperature produces an electric-motive force, as in the other instrument, which deflects the needle of the galvanometer. The temperatures are deduced from the fourth power law—viz., the amount of energy radiated is proportional to the fourth power of the absolute temperature. For temperatures below 500° C. a mercury thermometer is used.

The method of supplying town's gas and air to the various furnaces differs in many ways; and the author drew attention to three distinct types for which there has been a demand in this district. The means adopted for admitting the air necessary for combustion is the chief difference. Referring first to the natural draught type, the author said there has been a good demand for this; the largest natural-draught oven in use in Leeds being 22 ft. 6 in. long. One is being erected having a length of 33 ft. As to the low-pressure air type, they have recently supplied one 16 ft. in length for the heat treatment of steel bars. The largest furnace of the air-blast type working in Leeds has a consumption of 4000 c.ft. of gas per hour.

Mr. Leask then went on to describe briefly the processes of heat treatment, annealing, hardening, tempering, forging, case-hardening, normalizing or re-heating, annealing copper, metal-melting, and glasswork. He said that in the Leeds district there are air-blast furnaces for nosing shells up to 15 in. in diameter. In normalizing the shackles used in aeroplane construction, the gas consumption works out at 200 c.ft. per thousand shackles treated. The annealing of copper bands for shells is being done in the Leeds district; the furnace used being the low-pressure gas and air ("L.P.G.A.") type. A furnace having a working space of 36 in. by 24 in. by 12 in. consumes 400 c.ft. of gas per hour; and half an hour is the time required for heating a charge of copper bands.

Metal Melting.

Considerable progress has been made in the use of gas for melting brass, copper, &c.; and we have some installations which will deal with upwards of 2 tons of metal per day. Air-blast crucible furnaces are used; and the tilting type is now becoming popular owing to the convenience with which large quantities of metal may be handled. We have installed several tilting furnaces of 600 lbs. brass capacity. Under working conditions, the gas consumption for brass melting is 3 to 4 c.ft. per pound, and for copper 4 to 4½ c.ft. of gas per pound melted. Considerably lower figures than these have been published; and we have melted copper in our demonstration room for 2 c.ft. of gas per pound. I do not, however, think it advisable to quote snap tests, as it is working conditions only that the prospective customer is interested in.

The life of the crucible is much longer with gas firing than with solid fuel. At a low estimate, twice the number of heats may be obtained. I have known over fifty heats obtained from one pot, and much larger numbers have been reported. The great advantage of gas for crucible furnaces is, however, the speed in which the metal may be melted. With a 100 lb. capacity furnace of the pit type, a melt may be obtained every hour; and in a foundry working a little overtime, I have known twelve melts to be obtained in one day. This is double the output of a coke-fired furnace of the same size.

Glass Industry.

There are several bottle works in this district; and gas-fired furnaces are being largely adopted in place of solid fuel. For the softening of bottle necks, the small "glory hole" furnace is used; and the following is a three months' test:

Period of Test, June 19 to Sept. 19, 1916.

Gas consumption per furnace	88,000 c.ft.
,, per working hour	60 c.ft.
Output of bottles per hour per furnace. . . .	2½ gross.

Demonstrations.

Having such a variety of appliances to deal with, it is necessary to have an operator to handle the furnaces in the correct manner. Demonstrations are arranged to meet the convenience of consumers, who may bring their own material to be treated. It seems remarkable that up to the present time gas-furnaces have been adopted by every customer who has had a sample of work heat-treated in our demonstration room. Special tools and machine parts requiring hardening or case-hardening, and which are likely to present some difficulty, are frequently sent here to be treated. Quite recently the normalizing of a quantity of small forgings was giving considerable trouble to a local firm, and many were being rejected by the inspector. A batch was sent down here, and special care was taken with the heat treatment, which was carried out to a definite specification. The heat was applied very gradually; and after the required temperature had been reached, great care was taken to cool-down as slowly as possible—all the flue dampers and air inlets being closed immediately the gas was turned out. After the treatment had been completed, every piece passed the required test.

Demonstrations are also conducted upon consumers' own premises. After completing an installation, our operator remains to give instructions in the correct use of the plant installed. In this way, misuse of the furnaces may be avoided.

Having furnaces in stock, we are able to deal with cases where immediate delivery is essential. A short time ago, during a certain week-end, I received a call at home from the manager of an engineering works. The works had been partly destroyed by fire. I went down and found that a number of workmen were already engaged in reconstructing the premises. It was desired to recommence work in a portion of the building on the following day; but machine tools had to be made and hardened, and the tool-room had been completely destroyed, together with the gas-heated furnaces which I had the pleasure of supplying a few months before. However, we secured a motor wagon, visited our demonstration room, and the necessary furnaces for hardening and tempering were delivered within an hour.

Furnace makers may also use the demonstration room in order to influence business with any customer they may have in hand. It is of some assistance to them to be able to show the actual goods, and an advantage to the gas department in having the furnaces brought quickly into use on the district.

Conclusion.

The great impetus which has been given to the use of gas-fired furnaces by the exceptional demand for war material has fully demonstrated the utility of these appliances. Very large meters have been fitted upon consumers' premises—one having a capacity of 15,000 c.ft. of gas per hour; and we have one on order for another works requiring 12,000 c.ft. per hour. As these munition factories work day and night, it will be understood that the consumption of gas is considerable. The speed and accuracy with which the work is being turned out provides a useful selling point for the future. There will undoubtedly be a great demand for gas for industrial purposes when peace time arrives. In offering these goods to engineers and manufacturers, we present a proposition which has for its object the serving of those to whom it is offered as well as providing a useful outlet for large quantities of town's gas.

In large industrial centres demonstration rooms are essential if the furnace business is to be developed. The use of gas for domestic heating and cooking was largely increased by making it easy for the householder to become acquainted with the gas fires and stoves. In pushing the sale of furnaces, I have not known anything better than doing a sample of work for the prospective customer. This method has rarely failed to convince. Besides selling the furnaces, it is necessary to keep in touch with all users, so that errors may be corrected and necessary repairs promptly carried out.

The "B.C.G.A.," and also the furnace makers, are doing a great deal of advertising, and the local demonstration room provides a means of finally convincing the customer and effecting a sale. I have found that the furnace makers are prepared to work hand in hand with gas departments for the furtherance of the business.

The paper was illustrated by diagrams and blue prints, and by specimens displayed on a table. Running over the samples, Mr. Leask showed brass castings of high-explosive shells; steel spade cutter spoiled by over-heating in an ordinary furnace, which could have been avoided by using a gas-furnace; and ⅛ in. bolts, of which one man could turn out six per minute. He also showed a case containing sixteen pieces of steel all exactly the same kind, heated to different temperatures, from 700° to 940°. The grain of the metal in the fractures—the pieces being broken—showed the correct heat to have been about 860°. Mr. Leask emphasized the value of the use of the pyrometer as a means of recording the heats

obtained. He showed some cutting-tools hardened in a gas-furnace—mentioning the great difficulty of keeping such tools straight in a solid fuel furnace. Other specimens included small shackling of various sizes, the forging of which was particularly desirable in a gas-furnace in which the heat could be strictly controlled, because they had to be specially treated to withstand a very severe Government test; and samples of case-hardening made from soft steel, in regard to which he mentioned that a small test-piece of iron was generally put in the furnace as a guide. Drawings and samples were also exhibited of parts of a high-explosive shell, forged in large quantities in gas-furnaces at Leeds.

DISCUSSION.

The CHAIRMAN said they had listened to an excellent paper on an up-to-date subject; and the author had foreshadowed what would ultimately become a very valuable asset in the progress of the gas industry.

Mr. CHARLES ROPER (Bradford) asked Mr. Leask if he had experienced any trouble with the furnaces owing to variation in the quality of the gas.

Mr. LEASK replied that any little trouble there had been had always been traced to variation in pressure, rather than in quality. They sometimes found the early day pressure was not so great as it was later. Trouble in this respect could be avoided by compressing the gas as well as the air. The early-morning pressure could not be said to have been unsatisfactory in the instances to which he referred. The quality did not much matter, so long as the mixture was correct. As to high-pressure gas in melting brass and copper, the pressure in the Leeds street-mains had been intended, of course, for street lighting, and was only 3 lbs.; and it was not suitable for melting brass or copper, unless the air were compressed. In Birmingham, they had a system of mains throughout the city which gave 12 lbs. pressure. With such a pressure, one might melt brass and copper without compressing air; but in Leeds it had not been found necessary to have anything like such a pressure.

Mr. S. H. PACKER asked whether it was really possible to melt nickel as a commercial proposition in a low-pressure gas-furnace, using an air-blast? He had heard of a firm having successfully done it at a demonstration; but he had since been informed that some quantity of aluminium was mixed with the nickel, which was hardly the proposition under consideration.

Mr. LEASK said he had no doubt it could be accomplished by gas. It had, indeed, been done in his own sight, in Birmingham. He fully believed it could be carried out as a commercial proposition. In Leeds, they had had inquiries for melting cast iron, which was still more difficult; but he had not yet been able to recommend this as a commercial proposition, because in Leeds they had plenty to do in furnace work on operations which they knew were successful. They would tackle other things later. As to dust and dirt getting into the air-compressor, in Leeds they fixed a fine gauze on the inlet side to catch it. With regard to quick-heating and air-blast, they did, of course, get a very much quicker heat than low-pressure gas would give. It had been stated, he understood, that one obtained a quicker heat than high-pressure gas; but he had had no experience of this, as it had not been found necessary in Leeds.

Mr. E. GARSED (Kippax) said almost the only use for furnaces in the case of small country gas-works was the village blacksmith. Was there any practicability in this direction?

Mr. LEASK replied that his undertaking had not so far got into the blacksmith's shop for horse-shoeing, though they hoped to do so. They had converted many smiths for tool-work and forging operations which were smiths' work. These things were hitherto always done in solid fuel furnaces; but the gas-furnaces had been very successful. The operation secured a much more regular output with the gas-furnace.

The CHAIRMAN remarked that they must all have been impressed by the immense strides which had already been made in gas-furnace work. It was a very encouraging sign for the gas industry. In the past, the promotion of these new innovations in the industry had been left too much to the gas-apparatus maker. It had been in only a few instances that the suppliers of gas had rendered much service of this kind. Leeds was one of those places which were taking a foremost part in trying to remove this stigma. It was to the mutual benefit of the supplier and the gas-apparatus maker that knowledge of these new methods should be spread. An increase of co-operative effort in the way of providing facilities for demonstrations was needed; and much credit was due to the Leeds Gas Department and to Mr. W. B. Leech (the Engineer and General Manager) for the excellent way in which they had developed the furnace business. The gas industry were proud of their achievements, and of the part they were playing in the winning of the war.

Mr. ROPER, moving a vote of thanks to the Leeds Gas Department, to Mr. Leech, and to Mr. Leask, said that in Bradford they were at the present moment engaged in opening out, in a smaller way, a very similar line of business.

Mr. J. M'LUSKY (Huddersfield), seconding, said in Huddersfield the Corporation had not so far gone much into the furnace business.

Mr. LEASK, in replying, said he must acknowledge his indebtedness to the Leeds Gas Department and to Mr. Leech for the facilities which had been offered in this business. Mr. Leech had always been ready to support anything which was required in connection with the advancement of the furnace work, and also in connection with the meetings of the Yorkshire Junior Gas Association.

Mr. LEECH, who also responded briefly, said he was glad to be among them for the first time as an elected member of the Association.

The party then adjourned to the furnace-room, where there was an inspection of the apparatus on view.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Visit to the Cupar Gas-Works.

Thirty members of the Scottish Junior Gas Association (Eastern District), under the chairmanship of Mr. J. J. SCOTT (the President), visited the Cupar Gas Company's works last Saturday, when they inspected the Woodall-Duckham vertical retorts introduced there in February of last year.

Mr. WILLIAM HONEYMAN, the Chairman of the Company, in welcoming the party, said the Company were satisfied with the new plant, which had given splendid results. The guarantee of the retort makers was 41,000 c.ft. per day per retort; and they had reached 52,000 c.ft.

Various officials, including Mr. James Macpherson, the Engineer, and Mr. L. L. Beale, representative of the Woodall-Duckham Company, showed the visitors over the works, and explained the advantages of the installation.

DESCRIPTION OF THE VERTICAL RETORT INSTALLATION.

Mr. MACPHERSON stated that the installation consisted of one setting, containing six retorts and two producers; each retort being so set that it could be either heated up or cooled down without interfering in any way with the working of the neighbouring retorts. The two producers were arranged so that the heating gases from either of them could be taken to any of the retorts. Each retort was capable of carbonizing 3 t. 15 c. of coal per day, giving a total throughput of 22½ tons for the six retorts per twenty-four hours. The coal and coke hoppers were situated above the setting—being supported from a continuation of the side buckstays. The capacity of the hoppers was equal to 36 hours' maximum work. The coal-hoppers had sliding doors and extension pieces for feeding the coal into the auxiliary hoppers, and the coke-hoppers had shoots for feeding the coke into the producers. Both the coal and coke were raised to the top hoppers in small skips by means of a belt-driven hoist, a separate vertical steam-engine supplying the necessary power.

From the storage hoppers the coal passed through a through-way valve into the auxiliary hoppers, which contained two to three hours' supply. From these the coal passed continuously into the retorts; the speed being regulated by the extraction of coke at the bottom of the retorts. Under the coke extractors, cast-iron hoppers were fitted for receiving a two hours' make of coke; a water-sealed door being provided at the bottom.

The gas was taken away at the top of the retorts through an arched type of off-take into one common hydraulic main; each off-take being provided with a patent disc-valve, by which each retort could be shut off separately. The valve was machine-faced, and was unaffected by heat or foul gas. The hydraulic main had a fall to one end, where it was provided with an adjustable tar overflow and valve for flushing-out purposes; the gas passing from this main into an overhead foul main, and thence to the condensers.

The extractors were worked by a small steam-engine, which drove a countershaft running across the end of the bench; this shaft driving two reciprocating bars by means of eccentrics. The bars extended the entire length of the bench, and were fitted with small connecting rods for working the extractors, the drive being so arranged that the speed of each extractor could be separately regulated.

Each retort was separate from the next; a straight wall being built between each, so that any expansion might be taken up without affecting the brickwork of the adjoining retort. The flues conducting the gases from the producers were so arranged that they could be taken from either producer to heat any of the retorts. The secondary air passed through the regenerator and up through the centre of the bench, and was then conducted to either side of each retort, where it was controlled as required. Waste gases were taken away at the bottom of the heating flues, one main CO_2 damper controlling each retort. From there they passed to the end of the setting on to the regenerator, at the outlet of which three main dampers were situated. The course of the primary air was first along the sides of the bottoms of the retorts leading into one collecting flue, and then on to the vaporizers, where it was controlled by dampers before entering the furnace.

The auxiliary hoppers were filled up early, and the dischargers operated every two hours. The producers were charged every four hours, pricked-up once in twelve hours and clinkered three times per week.

The retorts had each produced 52,000 c.ft. per twenty-four hours; the make of gas being 11,300 c.ft. per ton, when using 80 p.ct. nuts, with 10 p.ct. of splint and 10 p.ct. of dross. The

quantity of coke used for heating worked out at an average of 17 lbs. per 100 lbs. of coal carbonized.

As regarded labour on the plant, two men were employed per twenty-four hours, the make of gas per man being 75,000 c.ft. per twelve hours.

Discussion.

After the members had been entertained to tea by the Gas Company, an interesting discussion took place.

Mr. HONEYMAN mentioned that the new plant promised great economy. They had never had a hitch.

Mr. W. MITCHELL (Dundee) said that they were satisfied with the vertical retorts in Dundee, where they had been working for two years. Eighty p.ct. of the coal was thus carbonized. They had one telpher for forty retorts; and, with only one man on the shift, there was a great saving in the handling of the coke. The tar was pumped into the hydraulic main in a continuous flow, which resulted in a reduction of alkaline impurity.

Mr. THOMAS HARPER (Forfar) said that the Forfar Corporation were something like the Cupar Company. Two years ago they considered the question of new retorts. There was no ground space for horizontals; so they decided to put in verticals. The result had been all that was expected, and a little more. Forfar had been rather extravagant in the way of machinery. All the coal was carried by elevators. They could deal with the necessary 20 tons of coal per day in two hours each morning. For the benefit of the younger members, he explained that they must not run away with the idea that when a company had vertical retorts, their troubles were finished. They were not finished unless the retorts received proper attention and care, which meant a little more brain power on the part of the stoker. Regarding naphthalene, this was not-existent with vertical retorts. Tar-washing and oil-washing were troubles which would disappear after the war. No doubt there was a heavy initial cost; but the saving of labour and the other advantages to be gained were well worth the expenditure.

Mr. MACPHERSON, the Engineer of the works, said that the Cupar plant covered space amounting to 48 ft. × 30 ft. The makers had guaranteed 250,000 c.ft. in twenty-four hours; but, without any pushing, the plant was capable of 300,000 c.ft. He was dissatisfied only with the amount of coke used as fuel; but when normal times returned this would improve. He had got it down to 17 lbs. per 100 lbs. of coal carbonized; but he believed it could be reduced to 13 or 14 lbs. He did not circulate tar in the hydraulic, which he flushed twice a week.

Mr. HARPER said his experience was that the charge for handling coal and coke had been reduced from 2·9d. per 1000 c.ft. to 1·5d., including 10 p.ct. increase in wages, by using the vertical retorts.

Mr. BEALE, in an explanatory statement, said that scurfing could be done during the week-end—a retort being off and on in forty hours.

Mr. HENRY RULE (Kelty) said that, in calculating the reduction in the cost of handling coal and coke, an allowance must be made for the wear and tear of machinery, also interest on the cost between the old and the new plant. Regarding residuals, in Forfar, with the horizontal retorts, they had obtained about 11 cwt. of coke per ton of coal. What was their experience with vertical retorts? The difficulty was to convince consumers that the coke from the latter was of better quality. In regard to vertical tar, did they find that they got as good a price for it?

Mr. HARPER admitted that the amount of coke per ton of coal produced in vertical retorts was less than in the case of horizontal retorts. The quality was better, being cleaner and absolutely dry, although a little harder. At present they were getting 8·4 cwt. per ton of coal. While this figure was low, he was confident they would retain their consumers for a longer period, for the time would come after the war when coke would not be so easily sold. Gas-works would have to look better after their coke; and vertical retorts formed a step in the right direction. While they would not get the same value per 100 gallons of vertical retort tar, there were no figures to show this, because the war had interfered with this commodity. Since the war had begun, the price of horizontal retort tar had fallen from 16s. to 9s. 6d. He hoped that after the war prices would rise again. But if they did not get the value per 100 gallons of tar, what they were getting from the coal in increased output of tar would make up for the lower price. Regarding sulphate of ammonia, they would do well if they got an average of 26 lbs. per ton of coal in horizontal retorts. In Forfar they obtained 27 lbs., and at present 31 lbs., due partly to the West Country coal being used. Therefore, although the coke was less in weight and the revenue was less, they were making more tar and more sulphate of ammonia, and they would get over 2000 c.ft. more of gas per ton of coal, so that there was ample evidence of the utility of the retorts.

Mr. J. B. SCOTT, JUN. (Cowdenbeath), said the point about the installation that appealed to him was the simplicity with which an extra retort could be added. They could have four retorts with one producer. Owing to the extra skill needed on the part of the stokers, the Company might have to pay a little more in wages to bring out the skill; but they could afford to do so, for the staff was reduced to a minimum. The conditions of the workmen employed on the vertical retorts could not be compared with the old system, with its heavy donkey work. Regarding the financial result, they must look to the residuals to bring back a large part of the price of the coal. In one or two Scottish works they could get the price of their coal, and slightly more, returned in the price of their residuals. Everyone must get somewhere near this. It might pay better to get more sulphate of ammonia and less coke, depending on local conditions.

The PRESIDENT said it had been demonstrated to them that vertical retorts were not limited to the larger sized works, for they had seen them that day in a gas-works with an output of 30 million c.ft.

Lieut. LAWRENCE FARQUHAR (home on furlough) expressed his appreciation of the Association in retaining him as their Vice-President. He remarked that Cupar possessed one of the cleanest little retort-houses he had ever seen.

The proceedings terminated with votes of thanks.

Natural Gas Business in America.

Few people realize the fact that the consumption of natural gas in the United States amounts to about three times the entire output of the statutory gas undertakings in the British Isles. According to the "Natural Gas Journal," statistics for the first nine months of 1916 indicate that the year will prove a record in respect to output, income, and profits. The consumption in the previous year was 628,580,000,000 c.ft., valued at $101,312,381, and estimates put the value for 1916 at about $115,000,000. The average selling price in 1915 was 16·12 c. per 1000 c.ft., the rates varying from a minimum of 8·47 c. to a maximum of 29·27 c. The extraction of gasoline will also be more than doubled; the production being now equivalent to 2·57 gallons per 1000 c.ft. of gas. The total for 1915 was 65,000,000 gallons, valued at $5,151,000, or just over one gallon per 1000 c.ft. Mr. Reger, Assistant Geologist of the West Virginia Geological Survey, says the natural gas has brought back to the State manufacturing mills of every description, including glass making, carbon black, and steel. In 1915, the State produced 244,000,000,000 c.ft. of natural gas—more than one-third of the total production in the United States, the greater part of which was delivered into the neighbouring States of Pennsylvania and Ohio.

Gas-Engine Lubrication.

In a paper which he read before the Institute of Marine Engineers last Tuesday week, Mr. W. H. Reay said that the efficiency and reliability of gas-engines can be greatly increased by the selection of a high-grade oil, together with a good method of application. The average temperature during the explosion stroke is about 1400° Fahr.; but with proper cooling, the temperature of the cylinder walls will be between 200° and 300° Fahr., thus enabling the oil-film on them to do its work without being burned away too quickly. One of three methods is usually employed in the lubrication of gas-engine cylinders—wire dip feed, gravity sight drop feed, and mechanically operated lubrication. The wire dip method is very irregular, and only feeds in proportion to the amount of oil in the container, giving about four times as much when full as when nearly empty. With the gravity sight-feed drop oilers, the feed when the container is nearly full will be about three times as great as when it is nearly empty. Thus in both cases, if the quantity of oil fed at low level is sufficient, then the extra amount fed when the container is full is not only wasted, but is detrimental to the efficient working of the engine. The best system is, therefore, by means of a mechanically-operated lubricator; the oil being forced in even quantities to the proper part of the piston. This is between the first and second back rings, when it is at the outer end of the stroke. Besides being more economical, this method is cleaner, as no oil runs to waste from the lip of the cylinder. A suitable high-grade oil will reduce the frictional losses to a minimum, as well as lower the cost of maintenance and lengthen the life of the engine. If an oil of too heavy body is used, the friction is increased, owing to the drag of the piston; and there is more likelihood of carbon deposit. On the other hand, if too light an oil is employed, it will break down when exposed to the high cylinder temperature, and cause wear to both the rings and cylinder.

American Factory Lighting.—There has been discussed at a joint meeting of the New York Sections of the American Society of Mechanical Engineers and the Illuminating Engineering Society the code of lighting for factories, mills, and other workplaces, recently issued by the Illuminating Engineering Society. Mr. Clewell (as the representative of the Illuminating Engineering Society) laid particular stress upon the intensity of artificial light required for various kinds of work, and claimed that his Society's code was greatly in advance of the British code. The four general classes of work mentioned in the new code are: (1) Storage spaces, passageways, &c., for which a minimum intensity of 0·25 foot-candle is recommended; (2) rough manufacturing, with an intensity of 1·25 foot-candles; (3) fine manufacturing and other operations, with a recommended illumination intensity of 3·50 foot-candles; (4) special cases of fine work, in which an intensity of from 10 to 15 foot-candles is considered desirable. Mr. Alford (for the American Society of Mechanical Engineers) thought that the plane upon which the illumination was to be measured should be specified at a definite number of inches—say, 30—above the floor.

DISTILLATION OF BROWN COAL IN GERMANY.

Germany for many years has practised low-temperature distillation of brown coal; but much of it is of unsuitable quality for the purpose, and really workable mineral, on a big industrial scale of distillation and refining, is found in only two quarters—namely, Saale, in Saxon Thuringia, and at Messel, near Darmstadt. After stating these facts in a paper which he read last Tuesday before the Edinburgh and East of Scotland Section of the Society of Chemical Industry, Mr. D. R. Steuart, F.I.C., F.R.S.E., Chief of the Chemical Staff of the Broxburn Oil Company, went on to say that even these two coals differ greatly in constituency, rendering necessary much difference in the methods of retorting.

The Messel coal is unique in its nature, a mixture of bituminous clay and coal, the organic matter in combination with the mineral matter, and with a high percentage of moisture, like ordinary brown coal, and a high percentage of ash-like shale. Lying 480 ft. thick, under about 13 ft. of cover, it fills an ancient hemispherical depression in onion-like layers, and with about 240 acres of extent; the fossils indicating a joint animal and vegetable origin. The crude oil is distilled in the presence of steam, the coke dropped, and the gas used for heating the retorts, which are of vertical type, similar to those in Scottish use, only the flues are more spacious. The working is continuous. A hopper on top serves with coal as required by means of a valve. In construction the retort is two-thirds iron; but the lower part, the gas producer, is firebrick. In the top the coal is dried; the steam thereby resulting being removed by an electrically driven fan. Part is returned to the retort further down; and part, by another fan, is passed into the bottom of the gas-producer, and there, as superheated steam, acts on the carbon and nitrogen for the production of water gas and ammonia. In the middle of the retort is distilled the oil; the products being led off thence to the condensers. The flues are divided into three compartments, a small passage communicating; this arrangement effecting a surging circulation of the products of combustion, keeping each at the desired temperature, and ensuring that what passes off into the chimney is in proportion to the suction. The vapours passing from the retort become partially cooled, causing the separation of ammoniacal liquor containing fixed ammonia salts and some soluble organic compounds. The still hot vapours pass up a kind of Glover tower; and there all the ammonia is caught by dilute sulphuric acid. The oil vapours, after passing from the tower, are cooled by water condensers. The gas is finally led up heavy oil-towers to catch the light spirit still left in it. The permanent gas, which averages 10,000 c.ft. per ton, is for the most part used to heat the retorts; the balance going to the power station.

EXTRACTING VAPOROUS CONSTITUENTS FROM GAS.

Dr. Lessing's New Method.

At the meeting of the London Section of the Society of Chemical Industry on Monday of last week, Dr. R. Lessing described an apparatus he has devised primarily for facilitating the extraction of benzol and toluol from coal gas. At present the apparatus is only in a form suitable for the analytical control of oil-washing plants and for laboratory research work, for which purpose it has been used during the past two years with very successful results. Indeed, it is this success that caused the Ministry of Munitions to encourage Dr. Lessing to publish the details of the process.

Having in mind the intricacies of present methods of gas washing with oil—which, said Dr. Lessing, exemplifies a certain justifiable reluctance on the part of gas managers of small and medium sized works to add the duties of chemical manufacturers to their already heavy responsibilities—he attempted to devise a process of benzol recovery which should combine extreme simplicity of design and working of the plant with a fair degree of efficiency. The use of a dry scrubber filled with a solid absorbent material which would strip the benzol from the gas without the employment of running wash-oil, and from which the volatile products could be extracted by steam distillation *in situ*, appeared to offer a solution of the problem. In considering the best form of absorbent material, spent oxide was put aside as not being sufficiently definitely absorbent, and as offering too much back-pressure; while crushed pitch was also finally rejected because, after its viscosity had been decreased sufficiently by the absorption of the solvents from the gas, it had a tendency to run, and so block the passages. It was therefore felt necessary to supply a rigid support for the absorbent material; and the following process was devised on this basis.

The gas is passed through a closed vessel which contains the porous material soaked in a suitable oil—for instance, green oil or gas oil. The inert material may consist of broken highly porous brick, preferably of moulded pieces of definite shape, volume, weight, and available surface. The various compounds in the gas which are soluble in the oil—*i.e.*, hydrocarbons and organic sulphur compounds which when isolated are liquid at ordinary temperatures—are absorbed. When the oil has taken up enough of the substance to be extracted—which will depend on the quantity and surface of the absorbing agent, the velocity and volume of the gas, the temperature and the degree of its saturation, the mutual solubility of the vapours and the absorbing oil, and the vapour pressure of the solution formed—the gas inlet and outlet valves are closed; the gas current being directed into the second vessel of the series. Steam is then blown through the material, carrying the vapours of the absorbed compounds with it to the water-cooled condenser, and finally to a receiver fitted with overflow pipes for water and crude benzol respectively.

It has been found advisable to provide the "scrubber still" with a jacket to avoid the condensation of steam, particularly on the walls. It is, however, not necessary to raise the whole of the inert carrying material to the temperature of distillation. When distillation is finished, the steam is shut off and the vessel cooled by passing water through the jacket, and it is then ready for the next scrubbing period. By employing three or more sets of the "scrubber stills," they can be worked in rotation; a definite schedule being arranged for the three periods of scrubbing, steaming, and cooling. In the case of the test apparatus, gas passes through at the rate of 5 c.ft. per hour; so that for a test of 100 c. ft. of gas twenty hours only are required, compared with four days with the method used of bubbling gas through a train of four wash-bottles.

The process has other uses to which it is hoped to put it later on when it can be made on a scale sufficiently large for works purposes. At present, the production of benzol is the object in view. But the process can be applied to the identification and quantitative relation of the other compounds of the mixture of vapours in coal gas; and its use in this connection is regarded as of the highest importance. In other words, it will afford a simple test of the quality of gas.

The test apparatus was demonstrated at the meeting, and the gas after passing it, burned with a blue and perfectly steady flame, in striking contrast to the gas taken directly from the ordinary district supply.

THE CONSTITUTION OF COAL.

The constitution of coal was discussed in two papers by Dr. R. V. WHEELER and Dr. MARIE C. STOPES at the meeting of the London Section of the Society of Chemical Industry on Monday of last week.

Dr. Wheeler, who spoke first, said that chemists have shown too great a tendency to overlook the palæo-botanical study of the structure of coal; and as this was the most important side of the question, so far as this discussion was concerned, he proposed to leave the greater part of the discussion to be dealt with by Dr. Marie Stopes. The object aimed at was to obtain a classification of coals in such a manner that their use for different purposes was readily apparent. Certain classifications had been proposed from time to time; but the recent interest in the palæo-botanical side was throwing a great deal more light upon the question. Of the older classifications, that proposed by Seyler was the best. It was based upon his work on Welsh coals, and put on one side lignites and brown coals containing less than 84 p.ct. of carbon, and, on the other side, classified the remaining true coals according to their percentage of hydrogen, of which the anthracites contain less than 4 p.ct. Campbell, of the United States Geological Survey, had proposed a similar classification. These proposals, however, ignored the significance of the fact that coal embodied several compounds, each containing carbon, hydrogen, and oxygen in different proportions. The late Prof. Vivian B. Lewes attempted a more rational classification, which took account of this fact. But his attempt was premature, as the nature of the humic binding material of coal had not then been made out, and was now the subject of investigation.

Dr. Marie Stopes said that, notwithstanding the interest that was being taken in palæo-botany, it was still in a state of benighted darkness about coal. The subject had been very much neglected since the early part of last century until comparatively recently; but even this work had not been done in conjunction with chemists. At the present moment, however, collaboration was taking place, and she had great hopes for the future. The definition of coal from the palæo-botanist's point of view was that ordinary coal is a stratified mass of mummified plants—not fossil—decayed to varying degrees of completeness and free of other matter. Unless the mass essentially and substantially consisted of mummified plants, it was not coal.

Dr. Stopes then threw on the screen sections of a large number of coals, and pointed out how palæo-botany can assist in arriving at a classification of coals in the way mentioned by Dr. Wheeler.

The annual meeting of the Midland Association of Gas Engineers and Managers has been fixed for Thursday, March 22, when the President (Mr. George Stevenson, of Long Eaton) will deliver his address, and a short paper will afterwards be read and discussed.

The President of the Board of Trade has nominated Mr. Adam Nimmo to be Chairman of the Committee appointed to consider the position of the coal trade after the war, especially with reference to foreign competition. Mr. Nimmo takes the place of Lord Rhondda, who resigned in consequence of his acceptance of office as President of the Local Government Board.

THE LUMEN AS A MEASURE OF ILLUMINATING POWER.

The lumen was very much to the fore at the meeting of the Illuminating Engineering Society on Tuesday last. Prof. J. T. Morris, of the East London College, and Mr. F. W. Willcox discussed it in separate papers; and both urged the desirability of it as a measure of illuminating power.

Summary of Prof. Morris's Paper.

Prof. Morris said it is now generally agreed that illuminants should be rated in terms of the total amount of light yielded in all directions, though information regarding the distribution of light (polar curves, &c.) is necessary for certain purposes. The desirability of rating illuminants in terms of mean spherical candle power has been suggested. This would lead to the presentation of lower numerical values than those previously put forward, which from a commercial standpoint is objectionable. In addition, the mean spherical candle power is only an imaginary quantity, and somewhat difficult of conception.

In the report of the Committee of the American Illuminating Engineering Society on Nomenclature and Standards presented at the Convention last September, it is definitely specified that illuminants should be rated in terms of lumens* in the future; and it is understood that this decision will be adopted and put into practice by the lamp-makers in the United States. In this country, also, the makers of electric lamps contemplate adopting the lumen, though it may be necessary also to state candle-power values, and to show their relation to lumen values during the transition period. Obviously the change must be accompanied by efforts to make the new method of rating widely known and understood. Again, once the lamp-makers have adopted the necessary photometric apparatus, the ease of measurement and certainty of the result will recommend methods based on the measurement of total flux of light.

The time is therefore ripe for the Illuminating Engineering Society to consider this matter. The use of the lumen in connection with illuminating engineering calculations has several advantages. For example, if the lumens in each zone from a lighting unit are tabulated, the addition of these values gives the total output of light—*i.e.*, the total flux of light produced by the unit. This can be at once compared with the corresponding output in lumens of the lamp used in the lighting appliance—globe, reflector, &c.—and the efficiency of the latter readily ascertained. It is also convenient to work with lumens in the usual formulæ for determining the average illumination in a room resulting from a given arrangement of lamps, and particularly when the approximate average illumination over an area needs to be quickly determined. It also facilitates calculation of the illumination derived from extensive illuminated surfaces, such as occur in the case of indirect lighting.

Points from Mr. Willcox's Paper.

In his paper, Mr. Willcox says he thinks that the evolution of practical experience unavoidably leads to a flux conception in lighting problems. Candle power gives no complete indication of the actual quantity of light given by an illuminant. The fundamental requirement is a definite unit which will always clearly and invariably express one thing. This condition the lumen complies with and the candle power unit does not. The use of the lumen strongly recommends itself, for the simple reason that it cannot be manipulated. The luminous output of a lamp as expressed in lumens remains the same whatever the shape of the filament, and no matter what variations of external arrangements or what accessories (reflectors, &c.) are employed with the lamp—always, of course, allowing for any absorption losses there may be in the accessories.

The lumen is strictly defined as the unit of luminous flux. Luminous flux is radiant power evaluated according to its visibility—*i.e.*, its capacity to produce the sensation of light. Briefly stated, the lumen is the unit of the quantity of light flowing from a lamp or luminous source. The value established for the lumen is the amount of light from a unit source falling upon a unit surface, all points of which are at a unit distance from the source. To be more specific, assume a source of one spherical English candle, and place this at the centre of a sphere of one foot radius. It follows that the lumen is the amount of light which is falling upon one square foot of surface of this sphere. The total area of a sphere with one foot radius is 4π or 12·57 sq. ft. As each square foot represents a value of one lumen, there will therefore be 12·57 lumens on the total sphere. It follows from this that the lighting value in lumens of any lamp or luminous source is obtained by multiplying the mean spherical candle power of the source by this figure, 12·57. It follows from the above definition that a lumen will give an intensity of one foot candle over an area of one square foot. The average illumination at all points of our unit sphere mentioned above will be one foot-candle.

In previous discussions on this subject, the deficiencies of candle power have been admitted by almost every one discussing the matter. Many, however, seem to have been of the opinion that the adoption of "mean spherical candle power" would solve the difficulties; and they were not favourable, therefore, to the adoption of the lumen. It becomes desirable, therefore, to consider the merits of mean spherical candle power compared with the lumen. The conception of mean spherical candle power does not lend itself readily to express the volume of light in any given zone or section of space surrounding a luminous source. It is difficult, for example, to conceive expressing the amount of light in a 10° zone as so many "mean spherical candle powers." The conception is perfectly clear, however, when we express the volume of light in these zones in lumens. It is admitted that the lumen is a pure numerical function of the mean spherical candle power, as its derived value shows (the lumen equals 12·57 times the mean spherical candle power); so the two quantities are of the same general character. Nevertheless there are strong reasons for the adoption of an entirely new term or unit instead of the cumbersome term and conception of "mean spherical candle-power."

If the majority of engineers are clearly in agreement as to the desirability of adopting some more comprehensive unit, such as the "mean spherical candle power," surely it is a small matter as to whether we go a step further and have an entirely new unit of the same character as the mean spherical candle power, but one of a more simple name—one freed from any limiting preconceptions and conditions associated with candle power; one which is scientifically correct and properly co-ordinated in a complete system of lighting units; and one, therefore, more fully and better qualified to express clearly and definitely the conception of light as a flux—the fundamental idea where a radiation such as light is concerned. The hesitation or fear that many express about adopting or popularizing a new term seem more or less exaggerated. For a time, as in the case of all similar transitions, people's minds will think in candle powers as well as lumens; but, sooner or later, lumens will be used more or less entirely as the unit, in the same way that the kilogramme has displaced the former units of weight used in countries where the metric system has been adopted.

In the end, such a change will have many benefits in simplifying the whole subject of illumination. We have at the present time, in the measurement of light and illumination, three distinct units—candle power, mean spherical candle power, and foot-candles. The lumen gives us one unit and term to serve in place of all these units. The lumen expresses the luminous output for all conditions, in place of candle power, mean spherical candle power, &c. The lumens per square foot expresses the intensity of illumination in place of foot-candles; and the lumens per watt with electricity, or per cubic foot for gas, expresses the efficiency of a luminous source, taking all conditions and variations into consideration affecting the shape of the burner or the equipment of the lamp.

In view of the merits of the lumen as an all-round term for lighting practice, Mr. Willcox hopes that all manufacturers of lamps and lighting appliances, supply companies (both gas and electric), and all those having to do with light and illumination in Great Britain, will co-operate to assist in its introduction and popularization.

Discussion.

Mr. S. H. Callow, who was in favour of the change to the lumen, said the obvious course was for the Society, as representing the gas and electrical industries, to draw up a pamphlet in simple terms containing a number of worked-out examples which would be of service at any rate to the average contractor if not to the ordinary user of lamps. A pamphlet bearing the hall-mark of the Society might do a great deal towards establishing the lumen in the lighting industry. But without a deliberately thought-out campaign, there was great danger of nothing being done.

Mr. J. G. Clark (Gas Light & Coke Company) said that while being able to testify to the usefulness of the lumen from the practical point of view (very few days passed when he did not use it or think of it in some form or other), he was a little bit in doubt as to its general adoption. The rating of lamps resolved itself into two portions—the scientific and the commercial. The technical point of view hardly needed attention, because men connected with lighting now had all the information necessary for working out their problems. It was true they did not always have the lumen; but they had the polar curve. This reminded him that some speakers seemed to have given the impression that the luminous efficiency of a lamp was easily obtainable by putting it in an Ulbrecht sphere and getting the figure straight away. Distribution was often entirely ignored; but if they did anything to hide the effect of the distribution, they would be in a bigger hole than ever. It was very nice to have a simple figure of the total amount of light marked on the lamp; but if they did not know where the light was going, they did not get an exact guide as to the best form of lamp to employ. There might be two lamps of identical lumen power; but in the case of one lamp 60 p.ct. of the light might be going in the upward direction and 40 p.ct. below, and in the other the reverse might be the case. In the direct lighting system, practically all the light was downwards; and this meant the use of reflectors, which involved a loss of light because reflectors were not 90 p.ct.

* In view of the fact that the foot-candle is now so generally known as the unit of illumination, it may be convenient to define the lumen as the flux of light received by a surface of one square foot, and having an illumination over its area of one foot-candle. The flux of light emitted by a source is 4π (12·57) times its mean spherical candle power. Thus a 50-watt tungsten lamp operating at 0·8 candle per watt—*i.e.*, 1·25 watts per candle power—yields approximately 500 lumens.

efficiency. Therefore there was introduced the complication that with two lamps of the same indicated efficiency the final result was by no means the same when the reflectors and shades were used. The lamp which gave its light in the downward direction might show up better, and in this way the lumen might be a little misleading. Prof. Morris had pointed out that, to make the best use of the lumen, they would have to specify particular zones. This brought them back to the distribution curve; and in order to obtain this, it was necessary to go through the process of getting the normal polar curve of the lamp, and practically it did not take them very much further. He was inclined to think that the use of the term lumen was likely to be just as unsatisfactory as the various terms already in use. Really, lighting was a subject upon which a good deal of education was required; and the Council might see what could be done through educational institutions to make lighting as a practical problem a more general subject of study. When this was done the question solved itself, because no man who knew anything about lighting would be deceived by polar curves which seemed to have a bigger radius in one direction than another. In order to get the lumens for particular zones, the figures would have to be deduced from the polar curve; and this might just as well be done now as to have the lumen for the unit. He really had a little doubt as to whether the time had arrived for making a change from the present system. It seemed that, even if they did not get out of the frying pan into the fire, they would get out of one frying pan into another.

Mr. G. CAMPBELL regretted that Mr. Clark did not see his way to support the lumen, because it would be a good thing for both sides of the lighting industry to get together and come to a common understanding. The present was a good opportunity, and might not occur again.

Mr. A. WISE, on the other hand, said the correct way of rating lamps was to give the mean spherical candle power as a total value, with a polar curve to show the illumination in various directions.

Mr. L. GASTER said that if the lamp and shade makers could come to a common agreement as to the question of rating lamps, the Society would do everything in its power to assist them to educate the public in understanding the new rating.

Mr. A. P. TROTTER, who was in the chair, said he might be regarded as an old-fashioned conservative heretic because he did not believe in lumens; yet he did not by any means disparage the lumen as a physical unit. The difficulty appeared to be to get a definition of the lumen that could be recommended to the man in the street. Otherwise he would think it was a catch, and that he was going to be had. The real point, however, was that the lamp trade had settled upon rating lamps in lumens; and they were entirely in the hands of the lamp trade.

Prof. MORRIS, replying to the discussion, welcomed the suggestion that the Society should issue a pamphlet.

Mr. WILLCOX, who also replied, said he was interested in the difficulties Mr. Clark had pointed out; but he could not understand what the difficulties were, because when the lumen values were established there would be data giving the lumen values in different zones. These could be added up to give the total lumens, and so the total amount of light given by the lamp would be known, which was not the case now.

COKE AND COKE-BREEZE FOR THE GENERATION OF STEAM.

Full consideration to the subject of the use of coke and coke-breeze for the generation of steam is given by Mr. J. B. C. Kershaw in an article contributed to the current number of the "Engineer." The more careful study of the problems of fuel combustion in recent years has, he points out, shown that practically every variety and type of combustible material can be burned, and its heat value converted into the thermal energy of steam, provided that the combustible matter exceeds 65 per cent., and that the furnace is correctly designed and the air supply properly distributed and proportioned to the needs of the fuel. Materials which have for many years been regarded as waste trade products are now being impressed into the service of the steam producer; and the combustion of coke and coke-breeze is in reality a much simpler problem than the burning of "towns' refuse," or of "bagasse" and other vegetable wastes, for purposes of power. This and the altered relative prices of coal and coke are his reasons for supplying data and information concerning the use of coke and coke-breeze for steam raising. Mr. Kershaw states that the correct regulation of the air supply to coke-fired boilers and furnaces is not more difficult than that to coal-fired furnaces; but there is no smoke to warn the firemen when the air supply is deficient. With both types of fuel constant testing of the waste gases is an essential of good management and of high efficiencies. Under scientific management, however, it is possible to obtain a higher average percentage of carbonic acid in the waste gases with coke than with ordinary bituminous coal, which means that the chimney losses of heat in the exit gas are reduced considerably, and that a higher efficiency is obtained from the fuel. The further advantage of smokelessness is, of course, a considerable one—especially in those industrial centres where the smoke inspector is active—for under no conditions of neglect can coke-fired boilers and furnaces produce black smoke. In regard to actual results obtained with coke and coke-breeze firing, the author quotes from the paper read by Mr. E. W. L. Nicol, Engineer and Fuel Expert to the London Coke Committee, before the London and Southern District Junior Gas Association, which was published in the "JOURNAL" for March 28 last year.

Cases of "T.N.T." Poisoning.

During an inquest on the body of Harriet Chandler, aged 18, who died in St. Bartholomew's Hospital from "T.N.T." poisoning, the Managing-Director of the Company for whom she had worked said the employees were given free milk every morning, and overalls, slippers, gloves, caps, and masks were provided, though very few would wear them. Every precaution was taken to see that the workers washed before taking their meals. The Medical Officer of the factory (Dr. J. Percival Barnes) and Dr. D. H. Spilsbury stated that it was in the early stages of these cases that medical treatment was most beneficial; and workers in "T.N.T." should be examined once a fortnight, so that the earlier symptoms could be detected. In returning a verdict of "Death by misadventure," the Jury added a rider to the effect that the employees at all munition factories should be medically examined once a fortnight. In the case of Edith Staley, a married woman, 27 years of age, who died in a Yorkshire infirmary, it was stated that she had worked first in the "T.N.T." department of a factory and subsequently in another branch, to get to which she had to pass the "T.N.T." department. She was on Dec. 23 struck on the head by a falling spanner; but the doctor said he found conditions of "T.N.T." poisoning, and he did not think the wound by the spanner had any connection with the cause of death. The Jury, however, returned a verdict of "Accidental death from 'T.N.T.' poisoning, accelerated by the blow on the head."

Irish Gas Prices.—The Ardee Gas Company have raised the price of gas for lighting from 7s. 6d. to 8s. 9d. per 1000 feet, and for cooking from 6s. 8d. to 7s. 1d. At the Warrenpoint Urban Council, a letter was read from the Secretary of the gas-works to the effect that the increased price was largely due to the enormous rise in cost of materials. The Council decided to draw the attention of Mr. MacVeagh, M.P., to the matter, and to ask him to move in regard to a reduction of freights.

Exemption Case at Pudsey.—At the local tribunal last week, the Pudsey Gas Company supported the appeal of John William Ackroyd, a carter, aged 36, who, at a previous hearing, had been in the employ of a stone merchant and had been exempted conditionally on going on national work. He asked for the tribunal's approval of the Gas Company's work. Mr. John Wilkinson, the Secretary and Manager of the Company, said the Ministry of Munitions were complaining that the Company were not delivering coke to certain munition works; and though they had explained their labour handicap, the reply had been that the coke must be delivered. In answer to a question as to whether the Company would release a young man for Ackroyd, Mr. Wilkinson said he had no young men left. Eventually, the tribunal approved Ackroyd's working for the Company.

A Coal Contract at Goole.—At a meeting of the Goole Urban District Council, the Clerk stated, in regard to a contract to supply them with gas coal, that the Wharncliffe Colliery Company had stated that they were of opinion they had already exceeded what could be reasonably expected of them in existing circumstances. Mr. Bevan moved that legal proceedings be instituted for enforcing compliance with the provisions of the contract, which was entered into on Nov. 9, 1914. Mr. Hill considered that, in view of present difficulties, and the shortage of labour, the Company had done what could be reasonably expected; and he moved that the matter be referred back. Mr. Bickerton said the Company agreed to supply 2000 tons of coal, and gave an option for a further 2000 tons. The Council really needed the latter quantity; and he considered that its supply should be pressed for. Mr. Hill's amendment was not seconded, and Mr. Bevan's resolution was carried.

Rotherham and the Sheffield Gas Bill.—The Rotherham Borough Council have, at a special meeting, decided to oppose the Bill which is being promoted by the Sheffield United Gas Light Company. It was explained by Alderman Aizlewood (the Chairman of the Parliamentary Committee) that at the December meeting of the Council confirmation was given of the minutes of the Parliamentary Committee, which recommended opposition to the Bill. It was put forth in the minutes that the Council would be prejudicially affected by the measure. The Gas Company were seeking powers whereby they could take from the bye-product works in the surrounding district the waste gases, and convey them into their own area for distribution. This being so, they would have to come through Rotherham with the pipes, and they would break-up their roads. In fact, they were taking powers to do just as they liked. The Committee objected. He did not see why Rotherham should not utilize the gases themselves, and make a profit.

Local Government Board Inquiry at Ellesmere.—The desire of the Ellesmere Port Urban District Council for permission to suspend payments to their gas-works sinking fund for a period of five years, formed the subject of an inquiry last week by an Inspector of the Local Government Board. After a full statement by Mr. T. W. Francis (the Clerk), the Inspector said he gathered that the original idea was for the Council to make gas for the Shropshire Union Company. Mr. Francis replied that it was so; but when they went to arbitration, it was found the agreement had been so drawn up that they could purchase the town supply only. The Inspector said it appeared to him that there must be waste where there were two gas undertakings in one district; and, particularly at the present time, he thought it was opposed to economy. Mr. W. Newbigging (as Consulting Engineer to the Council) supported the application, and expressed the opinion that there was a distinct prospect of success for the undertaking in the future. It would, however, be much better if financial assistance could be afforded—at all events, for the time being. No opposition was offered to the application.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Toluol Plant at the Leeds Corporation Gas-Works.

SIR,—In the report of the visit of the Yorkshire District Junior Gas Association to the New Wortley (Leeds) Gas-Works, published in your issue of Dec. 19, there occur statements liable to misinterpretation, and which give impressions that we are sure Mr. Edwards did not intend to convey.

Speaking of the estimates made for the water and steam consumption by the toluol plant, Mr. Edwards alleged that in "all cases" these had been greatly underestimated. We designed and estimated for a plant to recover toluol only, which required an oil circulation of 40 to 50 gallons per ton of coal, and only necessitated the refining of about 15 p.ct. of the total crude products produced. Less than a month before the plant was ready to start, we received instructions from the Ministry of Munitions that the recovery of benzol (and with it solvent naphtha) was necessary. Very little alteration to the design of our plant was involved, but considerable change in the methods of working. Double the circulation of oil was required, and also the rectification of 70 to 75 p.ct. of the crude products obtained.

These changes obviously involved more than double the consumption of water and steam; and as town's water had been provided for the original scheme, we therefore suggested a water-cooling tower and circulating system. This not being agreed to, the only alternative was supplementing the town's supply from a disused gasholder tank. This proved too expensive; and eventually the holder water was employed exclusively, with the addition of water sprays.

With regard to the corrosion of the analyzer tubes, in the event of small quantities of tar getting into the still, sulphurous acid is produced, causing corrosion. Mr. Edwards points out that the primary still analyzer, dealing with unwashed products, is not affected.

In mentioning these new facts, we have no wish to deprecate Mr. Edwards' excellent management of the plant since it was placed under his control, for which we have nothing but praise.

For SIMON-CARVES, LTD.,
J. H. BROWN.

20, *Mount Street, Manchester,*
Jan. 18, 1917.

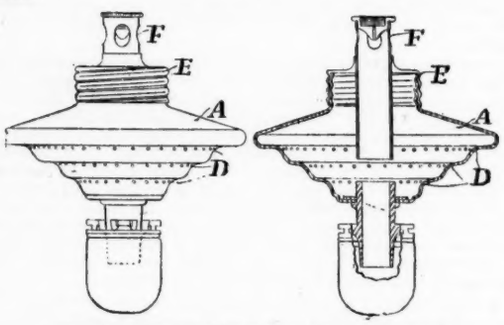
REGISTER OF PATENTS.

Inverted Burners for Heating and Lighting.

BIRCH, G., of Manchester.

No. 17,867; Dec. 22, 1915.

This invention relates to inverted gas bunsen burners for heating and lighting, provided with a muffle or chamber of refractory material, attached to which is a nozzle carrying an inverted gas-mantle. One or more rows of holes are pierced round about the under part of the muffle or chamber, whereby combustion takes place at the holes in the under part of the chamber and through the nozzle, giving light from the mantle as well as heat from the holes which are pierced in the chamber.



Birch's Combined Lighting and Heating Burner.

A is the muffle or chamber, of refractory material, to which is attached the nozzle which carries the mantle, and round which are pierced rows of holes D, "whereby combustion takes place at the holes in the underpart of the chamber and through the nozzle, giving light from the inverted gas-mantle as well as heat from the holes." The chamber is attached to the bunsen burner F by the cap E, and may be screwed to the burner.

Burners and Methods of Burning Gas.

TWOMEY, W. K., of Toledo, Ohio, U.S.A.

No. 18,092; Dec. 28, 1915.

This invention has for its principal object the provision of a burner and the employment of a method of burning gas, "which will cause the complete combustion of the gaseous mixture so that the resulting products of the combustion will be substantially odourless and have beneficial sterilizing properties."

The gas, initially mixed with air, is burned in a primary burner, from which the unburned portions and the products of combustion are broken up and subdivided, mixed with more air, heated, and confined, "to control or steady an otherwise possibly variable pressure." The mixture is burned a second time, and the resulting products are subjected to further mixing and heating, and then to a mechanical subdivision—being at the same time additionally heated. The gases are allowed to burn again at this time, and the products are again mixed, heated, and finally burned—that is to say, the mixture of gas and air is burned successively at least three times, with such intermediate treatment as to heating, mixing, subdividing, &c., between combustions "as will result in the eventually complete gaseous combustion."

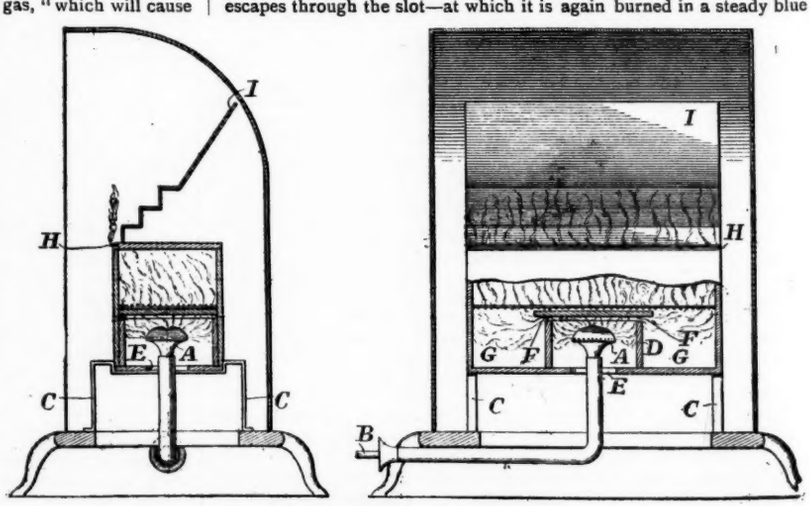
A central vertical cross-section through the structure is given; also, a vertical longitudinal section.

A primary burner-head A is provided, having the usual mixing tube, to which gas is delivered through the pipe B. The burner-head comprises a piece of metal, perforated with holes, through which the initial mixture of gas and air passes before ignition. The structure also comprises a base, on feet, equipped with two bent-bar supports or standards C, on which rests a centrally apertured plate through a hole in which the burner tube projects, as shown. A pressure-control box D, open bottom and top, rests on the plate, enclosing the burner and having its interior in communication with the outside atmosphere by the aperture E. This hollow, rectangular box, at its top edges, has short, upstanding spacing lugs, on which a cover plate rests, providing two jet-openings or slots F at the opposite ends of the box, beneath the cover-plate. A rectangular, hollow casing with an open bottom also rests on the central plate, and is of substantially the same width as the box D, snugly fitting over it, as illustrated. This casing is considerably longer than the box, and is provided beneath a grid or grille with a pair of compartments or chambers G, at opposite ends of the control box. This grid (a plurality of overlying, longitudinal and transverse rods or wires with intervening apertures or spaces) divides the interior of the casing into a lower and an upper chamber. At this front, upper edge, the casing is supplied with a jet-opening or discharge-slot H, at which the final combustion of the gaseous mixture occurs. The entire burner is contained within a housing I, open at the front for the discharge of the heat, and equipped with an inclined wall above the burner, which protects the flames from unduly strong air currents.

The operation of the burner is substantially as follows: The constituents of the gas and air mixture become thoroughly intermixed in passing to the burner A, and as the mixture escapes through the burner holes, it is burned—the oxygen for the combustion being supplied in part by the air mixed with the gas and by the external air drawn in through the aperture E, whereby a complete combustion of all elements of the mixture then capable of combustion is effected. The box D is relatively small; so that the flames from the burner jets impinge against its walls, heating the box to a low red heat. The box also performs the function of equalizing the more or less variable pressure of the gas, and "constitutes a pressure regulating chamber in which the products of combustion are heated and intimately mixed with the air entering through the opening E—the playing of the flames on the surfaces of the box acting to break-up the products of combustion and facilitate mixture with the air.

The gaseous mixture, as it escapes from the jet-openings or slots F, is again burned; the flames being in the chambers G. The swirling of the gases in these chambers, the changing of their direction of travel, and their temporary retention in these chambers by the grid, subjects the gaseous mixture additionally to the heat of the box D, bringing about a further admixture of the gaseous elements preparatory to additional combustion.

The mixture then passes up through the apertures of the grid, which causes their subdivision into relatively-small jets, each of which is heated by the grid. Then the jets are permitted to combine again in the chamber above, in which there is a burning of the lighter gases—the grid acting as a burner-head. From this chamber the heated mixture escapes through the slot—at which it is again burned in a steady blue



Twomey's Sterilizing Gas-Burner.

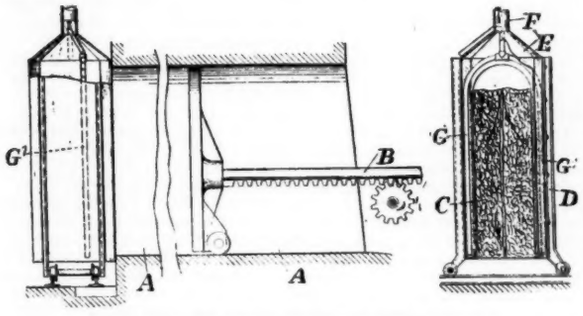
flame, the combustion of which may (or may not) be assisted by the oxygen of the external air. The issuing products from these successive combustions "are practically and substantially free from odour, and by reason of the heat to which they have been subjected, they are free from bacteria, and possess sterilizing characteristics or therapeutic properties."

Ammonia Production from Coke.—No. 101,154.

AARTS, J. G., of Dongen, Holland.

No. 11,202; Aug. 8, 1916.

This invention (relating to the production of ammonia by the action of steam on hot coke) proposes that the hot mass of coke, after its discharge from a carbonizing chamber, should be exposed over its whole length and at both sides to jets or streams of (preferably) superheated steam directed towards the middle of the mass under constant conditions of quantity, velocity, and temperature—for the steam as well as for the coke. In this way advantage is taken of the usual fissures in the longitudinal direction of the mass to allow of the rapid escape of the gases containing ammonia, so that dissociation of the latter is avoided as far as possible. Preferably, the glowing mass of coke, as it issues slowly and regularly, is moved past tubes arranged transversely to the direction of movement and provided with nozzles or slits from which the steam is blown. The velocity and the quantity of the steam should, the patentee states, be regulated in accordance with the velocity, the mass and the temperature of the coke, "so that a sufficient quantity of nascent hydrogen is formed to give the maximum yield of ammonia, and that the temperature of the coke is reduced sufficiently to prevent as far as possible decomposition of the ammonia formed."



Aart's Ammonia Recovery Coke-Oven Process.

A logitudinal section is given through a coke-oven and the travelling housing with steam-pipes and flue; also a cross-section through the housing.

A is the coke-oven; B, the ram which expels the coke; C, the mass of glowing coke with the central longitudinal fissure. D is a travelling housing having a hood E and a flue pipe F, through which the gases are withdrawn. The housing travels from one coke-oven to another, and is provided with steam-pipes G G¹. Removable plates form a loose separation between the housing and the mass of coke.

The process works as follows: As the ram expels the mass of coke from the oven into and through the housing, the coke passes slowly between the steam-pipes, which are provided with a narrow slit or with a corresponding series of nozzles at the side facing the coke, so that the latter passes between two streams of steam which act upon both surfaces of the mass. The direction of the steam is preferably horizontal. The gases are withdrawn with the aid of the hood E and the flue F as described.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 17.]

Nos. 325—696.

BILBROUGH, S. B.—"Distillation of coal, oil shales, &c." No. 576.
BREEZE, V.—"Making running joints gas-tight." No. 641.
CLEGG, J. H.—"Storage of gas in gas-works, &c., and distribution of gas therefrom." No. 494.
DRAKE, J. W., and DRAKES, LTD.—"Hydraulic mains used in manufacture of gas." No. 338.
HELPS, G.—"Burners and mantles." No. 392.
M'KIM, J. L.—"Pipe couplings." No. 516.
MANCHESTER FURNACES, LTD.—"Furnaces for heat treatment of metals." No. 419.
PRATT, A. W.—"Regulating pressure or flow of liquids." No. 483.
ROLLASON, A.—"Manufacture of fire-clay retorts." No. 542.
RUSSELL, W. A.—See MANCHESTER FURNACES. No. 419.
STANIFORTH, H.—See PRATT. No. 483.
SUTTON, C. J.—"Boxes for mantles." No. 339.
WEST & Co., A.—See Breeze. No. 641.
WILSON, W.—"Manufacture of gas." No. 476.

Dublin Street Lighting.—On Alderman Sir Joseph Dounes drawing the attention of the Dublin Corporation to the condition of the streets in the early morning, and suggesting that lighting might be extended for two hours up to March 1, Mr. L. Sherlock replied that the Lighting Committee "had no money;" the estimates having been cut down at the beginning of the financial year. The Council took no action.

LEGAL INTELLIGENCE.

LAW OF LIABILITY FOR GAS SUPPLIED.

HIGH COURT OF JUSTICE.—KING'S BENCH DIVISION.

(Divisional Court.)

Friday, Jan. 19.

(*Before the* LORD CHIEF JUSTICE *and Justices* RIDLEY *and* LUSH.)

Lea Bridge District Gas Company v. Malvern.

Mr. CAUTLEY said this was an appeal by plaintiffs on a case stated by Magistrates, from which it appeared that the respondent, Florence Malvern, was summoned for £6 8s. 1d. for gas supplied during the quarter ended Dec., 1915, and for a portion of the following quarter up to the time the gas was cut off in February. The Magistrates on hearing the summons dismissed it; and application was made for them to state a case, which they refused to do, on the ground that the application was frivolous. Application was then made to the Divisional Court, who ordered a case to be stated.* The amount in dispute was small; but the Company considered the point an important one. The case found that for some years prior to the end of March, 1915, the Company supplied gas in the ordinary way to Albert Wood, of Lindford Road, the husband of respondent; the accounts being duly paid by him. Albert Wood died on March 8, 1915; but the Company did not become aware of this fact till March, 1916. Respondent took out letters of administration, and continued to reside in the same house; and in August, 1915, she married Thomas Malvern. The Magistrates had found that Malvern became the tenant and occupier of the house. The Company rendered the account for gas due to Lady Day to Mrs. Wood, who paid it, as well as the Midsummer and Michaelmas quarters, which was six weeks after she had married Malvern. The account for the Christmas quarter amounted to £4 6s. 9d., and was made out to Mrs. Wood. Respondent wrote on Jan. 4, in the name of Mrs. Wood, not questioning liability, but merely disputing liability on the ground that the gas charged for had not been consumed. The Company had the meter tested; and the Inspector appointed under the Statute certified it to be correct. As respondent refused to pay the £4 6s. 9d., the gas was cut off. The Company then, for the first time, discovered that respondent had married again. On the hearing of the summons, the Magistrates were not satisfied that the meter was correct; and respondent then, for the first time, raised the contention that she was not the consumer, and that there was no contract with her—she being a married woman living on the premises with her husband. If the Court should be in his favour, the case would have to go back to the Magistrates to determine the amount due. For the Company, it was contended that the only question—whether respondent was the consumer of the gas—depended upon the meaning of the Gas-Works Clauses Act. It was not necessary to prove any contract; but if it were, the contract had to be implied. For the respondent, it was said she was not the tenant, and that a contract must be proved to enable the Company to succeed. The Magistrate held that respondent was not the tenant or occupier of the premises; that she was not the consumer; and that there was no contract between the Company and the respondent. Counsel submitted that there was a clear contract between Mrs. Malvern and the Company, and that all that was necessary was a requisition to supply gas. Here there was no question of estoppel. On the death of Mr. Wood, the widow was liable as his Executrix; and if she remained in occupation and consumed gas, she could not say she was there as administrator, as the estate would not be liable. The Company knew nothing of Mr. Malvern; and if the Magistrates were right, no one could be made liable.

The LORD CHIEF JUSTICE: Your point is that, on the death of Mr. Wood, who was the occupier, the Company continued to supply gas, and that this fact constituted a contract.

Mr. CAUTLEY said that was his contention.

Mr. ELLIS HILL, for respondent, contended on a decision of the House of Lords that his client was not liable. In the purchase of anything used for domestic purposes in the house the husband was liable, and anything the wife did she did as agent for the husband.

The LORD CHIEF JUSTICE said the case raised a question upon the peculiar facts as to whether Mrs. Malvern, who had married after a date she contracted for a supply of gas, could be made liable notwithstanding the subsequent marriage. The gas was in fact supplied without the Company's knowledge that there had been any change in the status of Mrs. Wood. The Magistrates had found that Mrs. Malvern was the occupier and tenant, and that there was no contract with Mrs. Wood, and also that she was not the consumer. But they left the question open to the Court to say whether or not, on the facts found, there was a contract. This was really a question of law and fact. His Lordship thought there was a contract with the lady after she paid the two quarterly accounts, and that the Company continued to supply gas by meter. The fact of having married again did not prevent the Company recovering for the gas supplied under the contract until she gave notice that she had married, so that the contract was at an end. It might be that the husband could have been made liable; but this point did not arise upon the case. On the facts, as found, he considered there was a contract by the lady to pay, and therefore the case must go back to the Magistrates to fix the amount.

The other members of the Court concurred; and respondent was ordered to pay the costs of the appeal and the application for a rule to the Magistrates.

* See "JOURNAL," Vol. CXXXIV., pp. 92, 695.

GAS GLOBE DELIVERY FRAUDS.

Four Defendants Sent to Prison.

Before Mr. Chester Jones yesterday (Monday), at the Lambeth Police Court, W. J. Kempton, H. Kempton, R. K. Kempton, and E. Hallett were charged with offences under the Prevention of Corruption and Bribery Act—the first three with offering bribes to Hallett, and Hallett with receiving the bribes.

The charges were made by the Attorney-General at the relation of the South Metropolitan Gas Company, for whom Mr. BODKIN appeared. W. J. and R. Kempton were represented by Mr. COMPSTON, K.C., and Mr. GOODMAN appeared for H. Kempton. Hallett was not represented.

All the defendants pleaded guilty, and expressed a desire for the Magistrate to deal with the case.

Mr. BODKIN, for the South Metropolitan Gas Company, in explaining the nature of the charges, said that W. J. and R. Kempton were partners and part proprietors of the business of C. Kempton & Sons, No. 42, Vauxhall Walk, S.E., manufacturers of glass globes used for gas-fittings; and H. Kempton was an employee of his brothers, and received a wage of £4 or £5 per week. The defendant Hallett was an employee of the South Metropolitan Gas Company, and had been with them for twenty-three years. Up to the time these charges were made, Hallett was in control of the fittings stores of the Gas Company. The firm of Kempton & Sons supplied the Gas Company with glass globes; and judging from the books, the South Metropolitan Gas Company and the Gas Light and Coke Company were practically the only two customers of the firm, although there were one or two small customers in addition. In his position in charge of the Stores Department, Hallett's duty was to receive goods from Kemptons; and the usual system was for Kemptons' carman to bring a delivery note with the goods to be delivered specified. When the carman delivered the goods to the store, he was given what was called a "Goods Received" note—a black form; and it was his next duty to take this document, and have what was known as an identifying number put upon it (which was a sort of serial number) in red ink. Then the goods were unpacked; and on the red ink marked "Goods Received" note there should be entered by the unpacker the exact quantity of goods received, together with a record of any breakages that might have occurred in transit. This document would then go back to Hallett, and the carman's delivery note as well as the "Goods Received" note should tally, with the exception of the small items of breakages. The goods would also be entered in the stock book of the Company as a check upon whether they were ordered.

This system Hallett altered in the early part of last year, when he retained the "Goods Received" note with the identifying red ink number relating to Kemptons' goods, and made up another black form, giving the goods delivered. What happened was that Hallett would enter on the red ink identified note particulars of the goods received, so as to tally with the delivery note of Kemptons' carman. The net result was that the goods mentioned on the "Delivery Note" and on the red ink "Goods Received" note were shown as more than were actually delivered. It was in April last year that this alteration in the system was introduced; but two employees of the Company working under Hallett (named Bull and Furrell), suspecting there was something wrong, kept records in notebooks of their own of the goods that actually came from Kemptons; and these records when compared with the Delivery notes of Kemptons and the Goods Received notes retained by Hallett, were less than the goods purported to be delivered. The next process was that Kemptons sent in an invoice for the goods which were in excess of the quantities actually delivered; and although this had been going on since April, the charges were based on three specific cases—viz, Nov. 1, when the excess amounted to £12 11s. 1d.; Nov. 14, when it was £3 9s. 6d.; and Nov. 30, when it was £7 3s. 11d. So far as could be discovered, however, the total amount which the Company had paid in this way in excess of the goods actually delivered was £250; and of this sum £59 was in the month of November.

As a result of the records which Bull and Furrell had made, Hallett was sent for on Dec. 11, and was questioned on the matter by Mr. Stokes, who was the Chief Inspector. But he then denied that anything was wrong. When asked for the delivery notes, he said he had destroyed them; but one was subsequently found in his desk. Hallett was suspended, and Kemptons were telephoned for copies of the delivery notes of Dec. 7. It had since come to knowledge that the same evening Hallett saw H. Kempton, and subsequently all the Kemptons came to the Company's offices, having previously sent to the Company the goods that were short on Dec. 7, which, however, were not accepted. In an interview with Mr. Stokes on Dec. 12 the whole series of transactions was admitted; and the Kemptons asked Mr. Stokes to do the best he could to prevent the Directors from taking the case to the Police Court—saying they had all been hard hit, and that this was why it had been done. It appeared that Hallett was handed sums of money by H. Kempton, varying from 10s. to as much as £4. The Gas Company, however, laid the papers before the Attorney-General, and a warrant was issued; but the defendants surrendered. From the books of the firm, which were readily handed over by an elder brother (who was a sleeping partner), it was seen that the entry "T.E." —meaning travelling expenses—very frequently occurred, and for the most part it amounted to £9. After the series of transactions with Hallett were discovered, however, this item suddenly fell to 25s. Hallett made a full statement of the position, in which he related how the Kemptons had asked him to be easy with their deliveries, as they were being hard hit. The matter, however, could not but be regarded as grave, because it was direct dishonest money making which was the reason for the seduction of a public company's servant. The Gas Company wished respectfully to place before the Magistrate that, but for the temptation Hallett had received, he would have continued as honest a man as he had been during the previous twenty years; and so far as they could they submitted that his case was very different from that of the Kemptons, and that if possible some consideration should be shown to him for his long period of service with the Company. Of the three Kemptons, H. Kempton had apparently acted as the intermediary between the firm and Hallett; and there was direct pecuniary interest to all three of the Kemptons for this long-continued course of corruption which it was the intention of the Act to prevent.

Mr. COMPSTON, addressing the Magistrate on behalf of W. & R. Kempton, said that he did so not by way of extenuation, but by way of explanation. The business of C. Kempton & Sons, glass blowers, was established forty years ago, by the father of the defendants, who were admitted partners, together with an elder brother. The partnership was dissolved on the death of the father in 1899; and the business since then had been carried on by the two defendants whom he represented, and an elder brother who was a sleeping partner and had a large financial interest in it. Four or five years ago, the firm laid down an expensive plant, costing £3000, to produce globes to fit a new type of burner which the South Metropolitan Gas Company had patented. Arrangements were made for these globes to be supplied at fair and reasonable prices; and had they been able to carry out the contract to the satisfaction of the Company, there would have been a substantial return for the money that had been laid out. The Gas Company, however—acting entirely within their legal rights, and concerning which there was no complaint—took a very severe view of the globes offered for delivery, and rejected large numbers, varying from 20 p.c. to 70 p.c.; and the consequence was that what the defendants had hoped would be a profitable contract had turned out to be a very unremunerative one, because when the globes were rejected by the Gas Company nobody else could make use of them, as they had been made for a special fitting patented by the Gas Company. After being disappointed in this way, the war came, and the point made by Mr. Bodkin—that the two Gas Companies he had named were the only customers of the firm was true after the war, because owing to the large demands of the companies and the great scarcity of labour, the smaller customers had to be sacrificed, and the energies of the firm devoted to the large customers. The cost of raw material went up very considerably, as it was all imported, and labour was difficult; and it was then that the Gas Company —being in difficulties as to obtaining globes which previously had been got from enemy countries—induced the firm of C. Kempton & Co. to undertake some costly experiments (amounting to £2000) which were quite successful, and having been successful they naturally felt themselves on the road to fortune. Then came the street lighting restrictions, and the demands of the South Metropolitan Gas Company fell from £600 a month to half the amount, and even to £200 a month. Then it was, unfortunately, that the defendants fell into the temptation of trying to recoup themselves their losses in the way they had done. That it was an isolated case, however, was shown by the fact that they dealt with another department of the Gas Company under entirely different managers; and there was not the slightest irregularity suggested in these transactions.

It was something to the credit of defendants that, immediately the matter was discovered, they expressed their sincere sorrow to the Gas Company, and offered to be allowed to work in any capacity in order to restore the damage the Company had sustained. They had already suffered very much. The prosecution had unavoidably been held-up for five weeks; and the mental suffering on the part of men who had been in business for themselves for nearly twenty-five years without a blemish on their reputation could be well imagined. They had also been punished immediately, because the partnership with the elder brother had been dissolved the moment this matter was challenged by the Gas Company; and the defendants were now reduced to the position of workmen. W. Kempton was 54 years of age and R. Kempton 48. The former had a wife and eight children, and one son had been lost in the war. R. Kempton was a widower with six children. Both expressed extreme contrition for the offence, and they threw themselves on the mercy of the Court. They were still strong and vigorous men, and capable of rendering good services to their country. They had skill and long experience in glass-blowing; and if permitted they desired most earnestly to be allowed to expiate their offence by taking any employment under the Government where their skill could be of use to the country. They came from a family of glass-blowers; and if it were possible for the Court not to impose the extreme penalty, he sincerely hoped that view would be taken.

Mr. GOODMAN addressed the Magistrate in similar terms on behalf of H. Kempton.

Mr. CHESTER JONES said this was undoubtedly a very serious case; but he did not think it was one which the Prevention of Bribery and Corruption Act really aimed at. It was a common case of fraud much more than offering and taking a bribe; and he should regard the case from this point of view. It was not so dangerous as an ordinary case of corruption; and it was unnecessary to impose the full penalty. He could not differentiate between any of the defendants, who would all be imprisoned for six weeks in the second division.

Mr. BODKIN raised the question of costs.

Mr. CHESTER JONES thought it unnecessary to harass the defendants any more.

Gorey Gas and Water Company to be Wound-Up.

Mr. Justice Barton, in the Chancery Division of the High Court of Ireland, Dublin, on a petition by Messrs. Wallace Bros., coal merchants, Dublin, made an order for the winding-up of the Gorey Gas and Water Company, and appointing Mr. A. Klinger Liquidator, with power to sell forthwith by tender, subject to the approval of the Judge, the amount of reserve price to be settled in chambers. The petition set out that the Company was indebted to the petitioners in the sum of £506 15s. 6d., being balance due for the price of coal. It was stated that a scheme of reconstruction of the Company had failed. Counsel for the Company consented to the order, realizing that this was the best course in their own interests and in those of the creditors. Mr. Justice Barton, in reference to statements in the petition, said he recognized that the Company had done everything they thought proper, and that there was nothing suspicious in what they had done.

MISCELLANEOUS NEWS.

MANCHESTER CORPORATION GAS DEPARTMENT.

Day Load Developments Counteract Restricted Lighting Effects.

At the usual fortnightly meeting of the Manchester Gas Committee last Friday—under the chairmanship of Alderman WILLIAM KAY, J.P. —the Superintendent of the Department (Mr. Frederick A. Price) submitted a report which showed that the consumption of gas in the nine months ended Dec. 31 had decreased, as compared with the figures for the corresponding period of 1915, by 157,399,000 c.ft. On analysis, the figures showed an increase of 4·60 p.ct. in the day consumption—8 a.m. to 4 p m.—and a decrease of 9·89 p.ct. in the night consumption, or a net decrease of 3·69 p.ct. over the figures for the corresponding period of 1915.

This decrease, says Mr. Price, is mainly attributable to the operation of the various Lighting Orders which have been in force during the period under review, resulting in the restriction of public and private lighting and the earlier closing of shops. The Summer Time Act, which was in operation from May 21 to Oct. 1, affected the consumption to a considerable extent—6·53 p.ct. for the summer period.

DEVELOPING DAY CONSUMPTION.

Manchester now has 192,046 consumers, of whom 76,500 are supplied through prepayment meters, as compared with 190,956 consumers at Dec. 31, 1915. The following increases in gas consuming apparatus are recorded: 6681 cookers, 1618 grillers, and 991 fires. This gratifying increase in the number of gas consuming apparatus accounts for the satisfactory increase of 4·60 p.ct. in the day load.

The total of each description of appliances in use at Dec. 31 last is as follows:

Cookers	92,818
Grillers	39,279
Fires	21,502
Total	153,599

or 9290 more than at Dec. 31. 1915.

WOMEN EMPLOYEES.

On the question of the substitution of women for men in the duties of clerks and inspectors, Mr. Price says: "Owing to the depletion of the men for the defence of their country, it became absolutely necessary last March to engage women to do the duties of clerks and inspectors; and at the present moment they number 77. The women are doing the work allotted to them fairly satisfactorily; and, with longer experience, they will undoubtedly become more efficient. Several women are now at work collecting from automatic meters; but they find the work somewhat heavy."

"CARRY ON."

Mr. Price concludes his report with a tribute to the staff, collectors, clerks, and inspectors, who, "by working early and late, and putting forth their best efforts, have managed to keep the Department going in spite of many difficulties."

GAS COMPANY'S DIFFICULTIES AT PORTSMOUTH.

A Prosecution Authorized.

According to the minutes of the Finance Committee submitted at the last meeting of the Portsmouth Borough Council, the Town Clerk, on receipt of information that the Portsea Island Gas Company had no benzol recovery plant at work, wrote to the Secretary (Mr. H. A. Stibbs) on the subject. The reply was that a plant had been erected at the Hilsea works; but that the Company had been unable to put up one at the Flathouse works owing to the absence of the necessary ground space.

When this matter was reached, the Town Clerk read a further communication which had been received from the Gas Company, in reply to a letter from the Council, accompanying the report of the Gas Examiner. This stated that, from the severe comments of the Examiner and the decision of the Committee, it was obvious that the serious disorganization caused by the present abnormal conditions, and the very great difficulties being experienced in maintaining the gas supply, were not properly understood. From the works department alone, nearly 200 of the regular men, many of them skilled, and all of them experienced, had been released for naval or military service. Many of the substitutes for these trained men had in turn been called to the Colours, and had been replaced as far as possible with elderly men or men physically unfit for military service; the general efficiency being thus very materially reduced. At the works alone, nearly fifty women were now engaged on work previously performed by men. At the Flathouse works, only four out of twelve men engaged in the process of purification had been retained; and the vacancies were filled by women or else by elderly men. The regular carters having been called up for military service, and others not being obtainable, it had been necessary to suspend the delivery of coke; and it was impossible to remove the refuse. The congestion resulting from the accumulation of these materials could not be realized by anyone who had not seen it. It not only interfered with the purifying process, but substantially restricted the manufacture of gas. The limited ground space also prevented any large quantity of coal being stored at the works; and, having regard to the reduced number of vessels available, and the fact that, owing to the precautions necessary, the voyage to and from the North of England occupied more than twice the normal time, the contractors were not always able to maintain adequate deliveries. Every step possible had been taken by the management to maintain a satisfactory service; and the recent impurities (which, unfortunately, had not yet been entirely removed), and also the reduced pressure, were wholly due to the grave shortage of labour, which was beyond the Company's control. Application was being made to the military authorities in the matter; and if this was granted, there would be no difficulty in providing a full and thoroughly satisfactory supply of gas in the near future. The letter concluded: "The Directors would ask the Council to believe that they are fully conscious of, and sincerely regret, the inconvenience which is being occasioned to consumers by the present admittedly impaired service. Not only are they most anxious to fulfil their obligations to the public, but they fully realize that the use of gas is being prejudiced by the present unsatisfactory supply. Their duty and self-interest combine to urge them to do everything humanly possibly to effect a speedy and lasting improvement; and this they are doing. They hope the Council, and also the consumers, will extend to them the consideration to which, in view of the very difficult conditions under which the work has to be performed, they believe they are entitled."

It was agreed to refer the matter to the Weights and Measures Sub-Committee. The Mayor (Mr. H. R. Pink) stated that, with the Town Clerk, he had visited the Flathouse works, and saw the great difficulty under which the work was carried on. He would attend at the next meeting of the Sub-Committee; and the Town Clerk and himself would be able to place a report of their visit before them. But whether this had anything to do with the Company allowing sulphuretted hydrogen to get into the gas was another matter.

The Finance Committee further reported having had under consideration reports of the Gas Examiner disclosing the presence of sulphuretted hydrogen in the gas supplied in the borough; and they recommended that legal proceedings be instituted against the Portsea Island Gas Company for the recovery of penalties in respect of such sulphuretted hydrogen being present from Dec. 18 to 22 inclusive in gas supplied by the Company. They went on to recommend that Mr. A. A. Moncrieff (Gas Examiner) be authorized to institute and carry on such proceedings on behalf of the Council.

Sir George Couzens remarked that this was a very serious question for the consumers. It was not the first occasion on which they had had to call attention to the presence of sulphuretted hydrogen in the gas; and the time had come when they should take an active part in seeing that the Company carried out their duties.

The recommendation was carried unanimously.

LEA BRIDGE CALORIFIC POWER ORDER.

Among the Orders which were mentioned in last week's issue as having been made by the Board of Trade under the Gas (Standard of Calorific Power) Act was that of the Lea Bridge District Gas Company. This is for the most part in similar terms to the Sheffield Order, which was reproduced on p. 382 of the "JOURNAL" for Nov. 21 last.

Regarding the apparatus to be used for testing for calorific power, it was proposed that it should be that prescribed by the Metropolitan Gas Referees. This has (following the Sheffield precedent) been amended to the following:

> "The apparatus shall be such as may be agreed upon between the Company and the Leyton Urban District Council and the Walthamstow Urban District Council, and shall be used in the mode and under the conditions set forth in the agreement. Failing such agreement, it shall be similar to the apparatus from time to time prescribed," &c.

A new sub-clause (*b*) of clause 8 is to be inserted, in place of the old sub-clause, as follows:

> (*b*) If, after the expiration of five years from the date of this Order, application is made to the Board of Trade by the Company or by any body or person who may appear to the Board of Trade to have a substantial interest in the matter, to reduce or increase the standard calorific power or the pressure prescribed by this Order, the Board of Trade, after hearing the parties and any other persons who appear to the Board to be interested, may make such reduction or increase of the standard calorific power or of the prescribed pressure as they think fit."

This, it will be noted, is somewhat broader, and includes a revision of the prescribed pressure, if thought necessary.

EXETER CITY COUNCIL AND CALORIFIC POWER.

At a Meeting of the Exeter City Council last Tuesday, the Town Clerk reported the receipt of a draft Order under the Gas (Standard of Calorific Power) Act. The Lighting Committee recommended that the Board of Trade be requested to provide in the Order that a gas examiner, appointed under the Gas-Works Clauses Act, 1871, may test the pressure at which the gas is supplied, and that the Gas Company shall afford all reasonable facilities for making the test.

Mr. CAMPION asked if there was a flat-flame burner on the market which would provide in all respects the result desired. He said the Order stated that the Company, if, and when, required at any time within two years of the date of the Order, by any consumer, shall supply to such consumer, and fix free of charge, flat-flame burners suitable in all respects for the consumption of gas of the standard calorific power prescribed, in substitution for any burners (not being incandescent burners) in use by the consumer before the date of the Order. He wished to know whether this was a genuine provision.

The TOWN CLERK replied that the clause referred to was inserted in all the Orders made by the Board of Trade. The Order stated that burners suitable in all respects for substitution should be provided.

Mr. M'GAHEY asked if the calorific power of the gas would be increased; and, if so, to what extent.

The TOWN CLERK said the Council did not know the present power, as they had no means of ascertaining it.

The recommendation was adopted.

SULPHATE OF AMMONIA AND NITRATE OF SODA.

Messrs. Bradbury and Hirsch's Market Review for 1916.

While fearing that their "Review of the Sulphate of Ammonia and Nitrate of Soda Markets for 1916" must be still less complete than was the one for the preceding year, Messrs. Bradbury and Hirsch, of Liverpool, state that, as far as possible, they have got together the more important facts and figures likely to be of interest; and they express the hope—which is certainly amply justified—that the review may continue to prove useful, notwithstanding shortcomings occasioned by existing circumstances.

SULPHATE OF AMMONIA.

Taking first the question of sulphate of ammonia, Messrs. Bradbury and Hirsch say that, on reference to their review of the market for 1915, they find that the concluding sentence in their comment upon the situation at the end of the year was: "We do not see in the actual circumstances reason to doubt the stability of the market for some way ahead at least; but if, as we suggest, buyers have, on the advancing market, bought more heavily and for earlier delivery than usual, there may possibly be a set-back in prices when the summer months are reached. The extent of demand for munition purposes will probably settle the latter point." In view of the other factors which came into play early in the year, and which are still in operation, it would serve no useful purpose to speculate upon what might have happened if the conditions which existed at the time that was written had survived through the present year. As a matter of fact, export demand, which they had been discussing, and which up to 1915 had been the main factor in determining the course of the market, has not in 1916 been the determining factor—not because there has not been an adequate demand for export, though in some directions it has been greatly hampered by inflated freight rates, but because it has not been possible to satisfy it and at the same time to reserve an adequate supply for home fertilizing and munition purposes.

The Export Trade.

In order to relieve the demand for agricultural purposes upon the supply of nitrate of soda, and with the object of largely increasing the use of sulphate of ammonia, the Board of Agriculture had for some months been bringing pressure to bear upon the Sulphate of Ammonia Association. About the middle of January, it was announced that an agreement had been arrived at by which a large proportion of the output over the spring months would be reserved for home fertilizing purposes, at a preferential price substantially below the then export value. At the same time, the War Trade Department of the Board of Trade began a rigid restraint on exports to neutral countries, partly for political reasons, but mainly to make sure that all British Possessions and allied countries should have a sufficient supply at prices not unduly inflated. A discussion of the question whether the same result might have been achieved by means less irksome to the large sulphate of ammonia manufacturers, would not be to the point in this connection. What has to be considered is the effect of the action of the different Government Departments; and in order that this effect may be made clear as far as exports are concerned, the figures are, in the review, set out in detail. From these tables, the total exports for the last two years are reproduced.

	Year 1916. Tons.		Year 1915 Tons.
France, Germany, and Belgium	25,183	..	11,430
Spain and Portugal, Italy, and the Canaries	72,806	..	77,113
Holland, Java, British Guiana, the West Indies, and Mauritius	116,623	..	161,974
Japan	9,155	..	10,537
United States	6,258	..	16,377
Other countries	29,287	..	16,877
Total exports	259,312	..	294,308

Commenting upon the statistics furnished by them, the reviewers say the July-December exports call for particular attention and for explanation, seeing that the figures show a shrinkage of only 2900 tons from those for July-December, 1915, notwithstanding increased demand for munitions and the special attention given to home agriculture within the six months. There can be no doubt—indeed, it is a fact—that very considerable shipments were of necessity held over into the second half of the year, owing to scarcity of freight-room. It would, moreover, appear that home consumption for fertilizing purposes has not been as large as it was anticipated that it would be. However that may have been, they are of opinion that a very substantial proportion of the shrinkage indicated by the January-June figures rightly belongs to the second half of the year, and that the July-December figures are not intelligible on any other hypothesis. The January-December figures in the aggregate show a decline of 34,996 tons upon the exports in 1915, and of 65,392 tons upon those in the last pre-war year, when high-water mark was reached—the exports in 1913 having been 324,704 tons. If the shrinkage in exports during the year (say) 35,000 tons, is added to the estimated increase in output (say) 15,000 tons, it would seem that home consumption for all purposes must have increased to the extent of 50,000 tons within the twelve months.

By comparing, a year ago, the exports in 1915 with those in 1913, Messrs. Bradbury and Hirsch showed that the entire trade had been completely altered by the war, either directly or indirectly; but supply and demand had, in the main, been allowed to have free play. During the past year, they say, home requirements, for both fertilizing and munition purposes, have become much larger; and, as these requirements have had to be adequately provided for, the course of the market has been determined by the action of the different Government Departments from time to time—a condition of things unprecedented, in the sulphate of ammonia trade, at any rate. It was known at the beginning of 1916 that demand for munition purposes must go on increasing; and this demand was largely relied upon to give stability to the market in face of shrinkages in shipments to Holland, the United States, Japan, and possibly Java, which had to be reckoned upon. It was also known that the Board of Agriculture were bent upon having an increased supply reserved for home fertilizing purposes; but no such drastic action as that which was announced about the middle of January was looked for. It was thought that a sufficient supply could be reserved by means of increased stringency in the matter of granting licences to export; and that if it had been intended to require producers to reserve a large proportion of their output for home consumption, an announcement to this effect would have been made months before, so that the large makers could not have sold, as they had done, the bulk of their output for export for delivery over the spring months. In the same way, exporters carried on their business as they had hitherto done, covering their forward sales by forward purchases from producers—not dreaming that sales permitted to be made by producers for forward delivery might not be fulfilled, owing to any Government restrictions.

The Course of Prices.

Up to the middle of January, there was, it is stated, an active market at advancing prices; but when the announcement already referred to was made, export demand ceased—or, rather, export business ceased—as it was impossible to estimate what effect the reserve for home consumption and the restriction of exports would ultimately have upon the market. It was, moreover, impossible to estimate how far the reserve for home consumption would actually be required, and therefore how far further contracts for export could be fulfilled. Consequently, from the middle of January up to the end of the month, export business ceased; and prices for both spot and forward were purely nominal. It took the greater part of February for those interested in the trade to find their feet, though a certain amount of business was being done. The opening price in February was £17 2s. 6d. per ton—12s. 6d. below the level reached in the second week in January. But the price at the close was down to £16 17s. 6d. per ton; and, with very little fluctuation, it remained thereat all through March. The same drab tone held the field during April, and towards the close there was a decline to £16 15s. per ton. In May, supplies available for export became more abundant, resulting in a decline to £16 12s. 6d. per ton, but there was a recovery to £16 18s. 9d. per ton before the month was out. Supply and demand were fairly well balanced in June; the closing price being £17 per ton.

There was good demand all through July, and an advance to £17 7s. 6d. per ton; the large reserve for munition and home fertilizing purposes occasioning a corresponding shrinkage in the supply available for export. Similarly, in August, the available supply was barely equal to requirements, though exporters had by this time become decidedly conservative in regard to fresh business. Hence the closing price of £17 12s. 6d. per ton. In September, the hand of the War Trade Department in the matter of granting licences to export made it impossible to deal adequately with demand from abroad; so that the price remained £17 12s. 6d. per ton. In October, however, it had become clearer that in the "off season" the full quantity reserved for home fertilizing purposes would not be required; and as licences were granted more freely, foreign business could be accepted more freely, with the result of an advance to £17 17s. 6d. per ton. There was no special feature in the market in November, and only a slight improvement in values; but in December there has been keen competition for available supplies, and a steady advance in prices up to the close of the month—£18 15s. per ton, f.o.b. Hull, being realized.

The average price, f.o.b. Hull, for January-June was £17 0s. 4d. per ton, or £3 9s. 9d. per ton above the average price for January-June, 1915. The average price for July-December works out to £17 15s. 5d. per ton, or £2 10s. 10d. per ton above the average price for July-December, 1915. The average price for the whole year is therefore £17 7s. 10d. per ton, and £3 0s. 3d. per ton above the average for 1915. It is necessary to go back as far as 1882 to find a higher average price for any one year—viz., £20 8s. 6d. per ton.

All the figures now quoted represent export prices only. Prior to autumn 1915, home demand was in open competition with demand for export, and prices paid for home consumption were always in relation to export values. So that average export prices fairly represented the average prices realized for the entire output. But since preferential prices came into play, the rule no longer holds; and as it is manifestly impossible for the firm to obtain particulars of all sales made for home consumption, they have confined themselves solely to export prices.

It is remarked by Messrs. Bradbury and Hirsch that, although, in estimating the output in 1915, they could not be very confident, owing to the upset in practically every industrial concern in the United Kingdom, they were only about ¾ p.ct. wide of the mark. They feel still greater diffidence in estimating the output in 1916—the upset being still more complete. Production of ammonia, calculated into sulphate of ammonia (including that used in the manufacture of ammonia soda, munitions, and for other chemical purposes), from all sources in the United Kingdom during 1916, they estimate, again with all reserve, at 438,000 tons, viz.:

	Tons.
Gas-works	175,000
Iron ,,	15,000
Shale ,,	58,000
Coke and carbonizing works and producer gas	190,000
	438,000

Of this quantity, it is calculated that England contributed 319,000

tons, Scotland 116,000 tons, and Ireland 3000 tons. The production in tons during the previous four years was:

	1915.	1914.	1913.	1912.
Gas-works . . .	173,500 ..	176,000 ..	182,000 ..	172,000
Iron ,, . . .	15,000 ..	16,000 ..	20,000 ..	17,000
Shale ,, . . .	59,000 ..	63,000 ..	63,000 ..	62,000
Coke and carbonizing and producer gas .	178,500 ..	171,000 ..	167,000 ..	137,000
Totals . . .	426,000 ..	426,000 ..	432,000 ..	388,000

The firm's estimate of production in the United Kingdom in 1915 was 3000 tons below the actual; and, as they are satisfied that their estimate of stocks in the hands of producers was fairly reliable, it follows that home consumption in 1915 was 3000 tons more than they supposed, which, they say, it might very well have been, in view of demand for munition purposes and the disposition of manure manufacturers to anticipate their requirements on the rising market towards the end of the year. Assuming that the stock at the end of 1915 was 26,000 tons, the account for 1916 will stand as follows:

	Tons.
Stocks brought forward from 1915	26,000
Production in 1916	438,000
	464,000
Exports during 1916	259,500
Home consumption (for all purposes) in 1916	178,500
Stocks to carry forward into 1917	26,000
	464,000

The actual output in the United States in 1915 proved to be 220,000 tons, or 8000 tons more than the quantity estimated. Production in 1916 is estimated by the Barrett Company, of New York, to have been 325,000 tons—that is, about 105,000 tons larger than the output in 1915. Of the 1916 production, 272,000 tons are being credited to bye-product coke-ovens—an increase of 98,000 tons upon the output from this source in 1915, leaving an increase of only 7000 tons to be credited to coal-gas plants and other sources. There can, the reviewers go on to state, be no question that a quite exceptional home demand for coke, and the tar derivatives, and ammonia for munitions for export, has occasioned such an extraordinary increase in carbonizing in the United States in 1916. They are not aware of any reason why operations should be relaxed while the war in Europe continues; but it may well be questioned whether anything like the rate of increase which there has been in 1916 will be seen in 1917.

Imports of sulphate of ammonia from the United Kingdom into the United States in 1916 were practically all in the month of January. Last spring fertilizing season in the United States was confessedly disappointing; and until recently home production of sulphate of ammonia has been sufficient to cover home requirements for all purposes. But in recent months there has been heavy demand from the United Kingdom for shipment to both Atlantic and Gulf ports, January forward, at extreme prices, which seems to prove that the United States requirements over the coming fertilizing season are not going to be covered by their greatly increased home production. It is a question whether these requirements can be adequately covered at all, owing to the firm grip of the British Government upon exports to neutral countries, if they have to depend materially upon outside supply. There is no need to consider any increased output in Japan, as this cannot in any way effect the market in the United Kingdom, for reasons which will presently become obvious. But it may be noted that Japan has recently come into the market again as a buyer.

The Present Situation and the Outlook.

As to the present situation and the outlook, this, say Messrs. Bradbury and Hirsch, may be described in a very few words. It has been demonstrated beyond question within the past six months that the world's demand upon the United Kingdom supply has been largely in excess of what the United Kingdom has been able to spare after making due provision for munition and home fertilizing requirements. A very substantial inducement, in the shape of a preferential price, has been given to the home agricultural interest to cover its spring requirements in the off-season; and this covering has been done on a larger scale than hitherto. But, notwithstanding this, the further demand over the spring season is certain to be substantially larger than that over the same period in any previous year, partly because the preferential price arranged for sulphate of ammonia will make this article cheaper by far than any other nitrogenous fertilizer, and partly because there is in the inflated value of all agricultural products every inducement to fertilize on the most liberal scale. And that requirements for munition purposes will also be on a decidedly larger scale than those during the spring months of 1916, goes without saying. This being the case, it cannot be doubted that the United Kingdom will be still less able to meet the world's demand than it has been during the recent months.

"What about the market?" they ask, and answer the question by saying that, if it were open to the world, there can be no question that prices would soar sky high. But, they proceed, it is not open to the world. It is firmly held by the Board of Agriculture and Fisheries; and it will continue to be so held. The requirements of British Colonies and Dependencies, as well as the requirements of allied countries, will be satisfied; and, so far as they can judge, the granting of licences to ship to neutral countries will be so adjusted to any remaining supply that there need be no further serious inflation of export prices. Something will, of course, depend upon the correctness of the Government estimate of home requirements for all purposes. But there should be no shortage of supply to cover such licences to export as are issued; and consequently there should be no desperate competition for this supply. The course of the market is thus in the hands of the Government. It will not be determined by the world's requirements in relation to the world's output, as it was in pre-war days.

From the point of view of home agriculture, the 1916 exports of sulphate of ammonia have been decidedly disappointing. When due account is taken of the largely increased consumption for munitions, which comes under the head of home consumption, it has to be admitted that there has not been that largely increased consumption for home fertilizing purposes which was contemplated by the Board of Agriculture and Fisheries, and to induce which no effort has been spared during the past year. Owing to the inflated price of nitrate of soda and scarcity of other nitrogenous fertilizers, the relative cheapness of sulphate of ammonia ought to bring about a much larger reversion to the use of it over the coming spring season. But to talk of reserving the entire output in the United Kingdom, as some economists are doing, is, if it refers to the immediate future, to talk nonsense. It would involve an entire revolution in home agriculture; and this cannot, for reasons obvious to agriculturists, be brought about in one season, or in two seasons either. To attempt any such thing, would be to cripple export business unnecessarily, and at the same time to leave producers with unwieldly stocks to carry forward. There is a further consideration. The reviewers suppose that sugar is only of less importance to the country than wheat and potatoes; and, if the sugar-growing Colonies were starved in the matter of fertilizers, they ask what alternative source of supply of sugar there would be while Germany and Austria are not available.

NITRATE OF SODA.

Dealing with nitrate of soda, Messrs. Bradbury and Hirsch say that the production has been practically at its pre-war maximum all through the year; and there has not at any time been any scarcity of actual supply on the West Coast. But an exceptionally heavy demand, both for Europe and the United States, has brought about the rapid advance in West Coast prices which has been experienced since the month of August, and the very strong position of the West Coast market at the present time. Prices in Europe have, in the main, been determined by freight rates, though the advance in West Coast prices in recent months has become an important factor to reckon with.

In alluding to West Coast prices, they refer to ordinary quality only; remarking that on the average the premium for refined has been about 4½d. per quintal, though it has been as little as 1½d. and as much as 7½d per quintal within the year. After a decline to 6s. 9d., there was in January a recovery to 7s. per quintal, free alongside. There was a decline to 6s. 10d. in February, and to 6s. 8d. in March. In March, however, the market became much firmer; and up to 7s. per quintal had been paid before the end of the month. In April up to 7s. 4d. was realized; and 7s. 6d. was the ruling price in May. There was a decline to 7s. 3½d. per quintal in June, and to 7s. in July. August saw a recovery to 7s. 6d., September to 8s., October to 8s. 9d., and November to 9s. At the close, near shipment was worth about 9s. 4½d. per quintal.

From 15s. 3d. per cwt., at Liverpool, at the outset, the spot price for ordinary quality advanced to 16s. 9d. in January. In February, the market was rather slow; but after a decline to 16s. 6d., there was a recovery to 16s. 10½d. per cwt. In March, the price became 17s. 3d. per cwt., in April 18s. 3d., and in May 18s. 7½d. The spring agricultural demand being over, and available supplies having consequently become more abundant, there was a set-back in June to 18s. 1½d. per cwt. In July, 17s. 9d. became the price, and in August 17s. 6d. There was a recovery to 17s. 9d. per cwt. at the end of September; and, after some fluctuation in October, the price became 18s. 3d. in November. There was a very strong market all through December; and the closing value was 19s. 9d. per cwt.

With production at the end of 1915 up to pre-war maximum, and with stocks on the West Coast about 60 p.ct. larger than those at the same period in any pre-war year, it was not at all clear how supplies were to be disposed of, if the rate of production was going to be maintained. But the rate of production has been fully maintained throughout the year, and stocks on the West Coast are now somewhat less than they were a year ago. The explanation lies in the fact that exports to Europe, Egypt, and Russia have increased about 550,000 tons upon the shipments in 1915; while those to the United States have increased about 350,000 upon the shipments in 1915. The total increase in exports has thus been about 900,000 tons.

The present situation may be summed up very briefly. Stocks on the West Coast have been reduced about 8 p.ct. within the year. Present West Coast prices afford a keen incentive to production; but under existing circumstances, the firm do not see how the output can be very materially increased. Assuming that within the next six months the increase may be equal to the shrinkage in stocks within the past year, they think that this will be going far enough; and it will mean that the total supply on the West Coast up to the end of June will be the same as the total West Coast supply for January-June, 1916.

Prices for the Coming Season.

As it is impossible to say how stocks in Europe and the United States compare with stocks at the end of 1915, Messrs. Bradbury and Hirsch say they can only discuss the outlook from the probable supply on the West Coast as a starting-point. But, even then, they know something of the capacity of the demand for munition purposes, which a year ago they could not even guess at. This has been an increasing demand; and there is good reason for believing that it will go on increasing over the spring months. Thus, if stocks in Europe and the United States are larger than they were a year ago, they do not see how there can be an overabundant supply, even if it is also assumed that available tonnage on the West Coast is going to be equal to the tonnage available over the same period in 1916. The inflated price, they add, will be a stiff fence for agriculture to negotiate; but what cheaper alternative is there outside the United Kingdom, where a preferential price has been fixed for sulphate of ammonia for home consumption? There is every inducement in the prices of all farm produce to fertilize on the most liberal scale; and even at the present inflated price, they do not look for a decline in the consumption of nitrate of soda for fertilizing purposes, wherever supplies are available. Therefore they do not see how easier prices can be expected in Europe and the United States over the coming season, or why there should be any material decline in values on the West Coast while the war lasts.

SOUTH SUBURBAN GAS COMPANY'S STANDARD.

The General Purposes Committee of the Lewisham Borough Council report that they are informed that the South Suburban Gas Company are applying to the Board of Trade for an Order to, among other things, substitute in certain parts of their area of supply, outside the borough, a provision reducing the existing standard for testing the quality of their gas. By the Company's Act of 1912, it is provided that in certain specified areas (which include the Borough of Lewisham) the gas supplied by the Company shall be of a standard calorific value of 540 B.Th.U. In the remaining district supplied by the Company, and to which the present application relates, the standard is an illuminating power one; and the proposal now is to substitute a standard calorific value of 475 B.Th.U. gross per cubic foot. This is, of course, lower than the standard fixed for the gas supplied by the Company in the area of the Lewisham borough; and the Council's Gas Examiner (Mr. Howard) points out that the Company are not in a position in which they can supply gas of the reduced standard proposed in one part of their district, without furnishing the same standard of gas in the remaining area of supply, and that the borough would therefore be adversely affected if the proposed varying Order were made.

No notice of the Company's application was sent to the Council, nor was it published in the borough; and it is doubtful whether any formal objection can now be made to the Board of Trade, even if the Council had a standing in the matter, as the time-limit for objections or representations with regard to the application has expired. The Committee, however, have directed that a communication be addressed to the Board of Trade, setting forth the views of the Gas Examiner on the matter, and asking that they should be considered in connection with the Company's application. The Committee think that, if any alteration is made in the standard of gas to be supplied in the district proposed, the standard should be the same as now existing in the remaining area of the Company's supply—viz., 540 B.Th.U.

"NEWS" FROM THE BALKANS.

What May Have Happened in Salonica.

The following has been forwarded by a correspondent, who states that it has been taken from the "Balkan News"—a "daily" which we have reason to believe is not altogether unconnected with the British Army in Salonica.

SALONICA GAS COMPANY.

ANNUAL MEETING.

The Annual Meeting of the shareholders of the Salonica Gas, Coal, and Coke Company was held in the office of the Company last night. Present, the Chairman and 22 shareholders.

CORRESPONDENCE.

A Kalamaria consumer wrote complaining that three-quarters of the coke ordered by him from the Company had been abstracted *en route* from the Company's yard to his residence. He had reason to believe that this was the work of the vendors of roast chestnuts, and suggested that the Company's camels should be more wary in future, and not go to sleep in the sun while on duty.

The CHAIRMAN said that, in his opinion, the responsibity of the Company ended when the coke was loaded on the camels.

A VOICE: Hear, hear! Tell him to go and eat coke. [Applause and laughter.]

The SECRETARY was instructed to deal with this matter as he thought fit.

PAINTING THE GASOMETER.

The CHAIRMAN stated that tenders had been invited for the supply of smoke-helmets for the use of the workmen who were to paint the interior of the starboard gasometer. It had been pointed out that the exterior of the gasometer had been painted to represent a tropical forest, to deceive enemy airmen; and a proposal had been mooted to render the interior pleasing to the eye also. The Company were nothing if not thorough. Objection had been raised, on the score that the gasometer would have to be emptied to enable the workmen to paint the interior, thus causing inconvenience to consumers. The Company had got over this difficulty, however, by arranging for a supply of disused smoke-helmets, to enable the decorators to wield their brushes safely midst the fumes of the gas.

THE SLOT SYSTEM.

The PRESIDENT OF THE SLOT COMMITTEE reported that the drachma in the slot-meter system had not been an unqualified success. There had been a certain amount of wangling. (VOICES: Oh!) The holes in 20 lepta pieces had been blocked with mud, and introduced into the meter as drachmæ.

It was resolved to prosecute the offenders under the Meddling with Municipal Machinery Act.

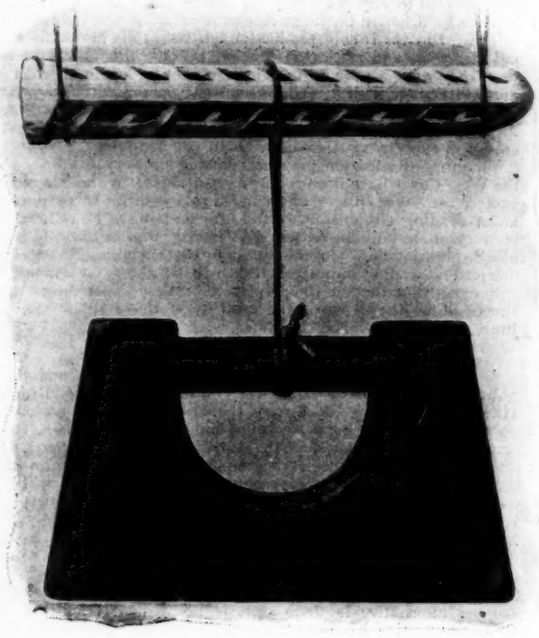
FINANCE.

The CHAIRMAN stated that a sum of 30,000,000 leptas represented the takings of the Company for the year just closed. "This is splendid," continued the Chairman, with emotion, "but next year I hope to see our gas blazing from city to city, from sea to sea. I can see its pure pristine beams rivalling the very sun in brilliancy and ——"

Here the gas failed; and the meeting broke up in some disorder.

The Directors of the Broadstairs Gas Company have granted permission to the Young Men's Christian Association to establish a centre in the old gas-works, which have been transformed into comfortable quarters for the troops.

ONE RADIANT PER FIRE PER ANNUM



A Leading Gas Authority tell us this is their **Maintenance Cost**

WHAT IS YOURS?

It will be similar if, like them, you make the - - -

"THERMO-X"

your Standard Radiant.

STRENGTH · DURABILITY and EFFICIENCY COMBINED.

John Wright & Co. Essex Works, Birmingham.

PROSPERITY AT ST. LOUIS.

There was a busy time at the end of the year, in connection with the Laclede Gas Light Company, of St. Louis (Mo.), when there were distributed bonuses to the 1650 employees and extra dividends to the 2000 stockholders, aggregating $1,170,000. Each employee of the Company received a bonus of 10 p.ct. of his or her entire year's salary, or the portion of a year employed. This aggregated about $100,000. The extra dividends of $1,070,000 to the stockholders resulted from a division of the Company's reserve, which has accumulated in the six years since the works were purchased from the North American Company. This amount is exclusive of the regular 7 p.ct. annual dividend on the stock.

Dealing with the matter, Mr. C. L. Holman (the President of the Company) said that large profits made from the sale of enormous quantities of bye-products to the warring countries of Europe made the past year the most prosperous in the history of the Company. These bye-products are benzol, toluol, solvent naphtha, and tars. The giving of bonuses to all employees is not intended to establish a precedent for future years, but is in a spirit of reward for loyalty and appreciation.

The Company feel that if they permit their employees to share in the profits of the prosperous years, and take care of them adequately in "lean years," they will be doing their duty toward those with whose help the interests of the undertaking are advanced. This extraordinarily prosperous year has been experienced, notwithstanding a reduction of gas rates of 5 c. per 1000 c.ft. last July, which has resulted in decreasing the gross receipts of the Company about $25,000 a month, aggregating $300,000 a year. The decline in the rate to large users has opened new avenues through which the Company believe their sales will be materially increased, and will more than offset the reduction in rate to small consumers. The reserve of $1,070,000, which will now be distributed, has been held in the Company's treasury for six years, to provide a fund for an adverse emergency. A prosperous year was awaited before ordering a distribution of the reserve. The abnormal conditions of the past year provided the opportunity; and the Directors felt that the stockholders were entitled to a division of the reserve.

Messrs. Brotherton & Co., Ltd., of Leeds, have opened offices at No. 516, Royal Liver Building, Liverpool.

The office of H.M. Trade Commissioner in New Zealand has forwarded some samples of china clay obtained from the deposits at Glen Massey. The samples are accompanied by a report by the Government Analyst, from which it appears that the clay is suitable for muffles, furnace-linings, and fire-brick. The samples and report may be inspected at the Department of Commercial Intelligence, No. 73, Basinghall Street, E.C.

NOTES FROM SCOTLAND.

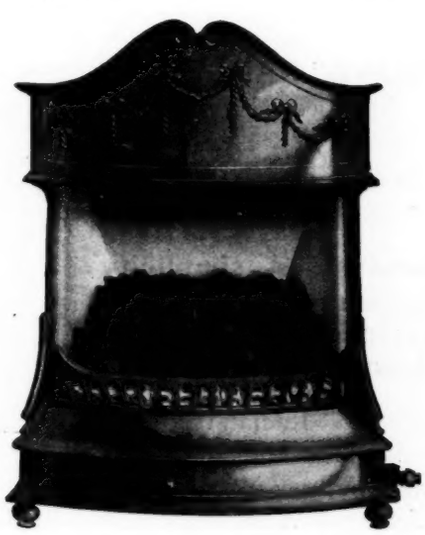
Quality of the Dumfermline Gas Supply.—There has been complaint about the quality of the Dumfermline gas supply; and it is even said that claims have been lodged with the Town Council by shopkeepers for loss of business, due either to weak illumination or defective heating. Mr. Alexander Waddell (Gas Manager) was asked to prepare a report on the question; and this was considered at a recent meeting of the Town Council. It was decided to obtain the service of an expert to report on the condition of the works.

Increase or War Bonus at Perth.—The Perth Gas Committee have considered a letter from the Organizing Secretary of the Gas-Workers' Union, in which the writer remarked that the men are quite prepared to accept the recent offer of 2s. per week, on condition that it is looked upon as an increase of wages, and not as a war bonus. It was further stated that unless this was agreed to, the men would call for arbitration on the question. The Committee did not feel disposed to take any action, in view of the fact that the question of increases had been remitted to the Finance Committee.

Pooling of Railway Wagons.—The terms of the scheme for the pooling of all wagons belonging to the railway companies and private traders in Scotland have, says the "Glasgow Herald," been finally adjusted at a conference held in Glasgow, at which representatives of the railway companies, coalmasters, and other wagon owners were present. It is proposed that the scheme, which will be submitted to the Board of Trade for approval, shall come into operation on Feb. 5. A census of all Scottish-owned wagons will be taken towards the end of the present month. Several conferences have been held recently between the various parties concerned for the fixing of charges for the hire of waggons, demurrage rates, and the amount to be paid to private traders and companies for the use of their wagons. It is understood that the agreement provides that Scottish-owned wagons shall be used only on Scottish railways.

More Light Wanted at Manchester.—A deputation appointed by the Manchester City Council have interviewed the Chief Constable of Manchester, and discussed with him the possibility of having more light in the streets of the city. The Chief Constable laid before the deputation correspondence with the Home Office, and said there were found to be serious difficulties in the way of increasing the lighting. It had been decided, however, to appoint a small Committee to visit a few towns where the conditions were comparable with those of Manchester to see whether any methods of improvement were suggested by them. When this Committee make their report, the question will be further discussed. It may be added that the Committee (including Alderman Kay, the Chairman of the Gas Committee) last week inspected the restricted lighting systems now in vogue in various large towns.

The "Fire Queen"



The Latest "Main" Gas Fire.

It is designed to co-ordinate in size with *any* modern Interior Grate.

The fire backs and heights overall are graded to coincide with the dimensions of Standard Grates. Note the appearance when in use. So like a bright coal fire, and it will pass all the "tests" for Efficiency and Ventilation.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 22.

Since last week there has been no alteration in the tar and sulphate of ammonia markets so far as prices go; the position being stationary. There are inquiries for considerable quantities of freed tar for road purposes.

Tar Products in the Provinces.

Jan. 22.

There is nothing fresh to report concerning the markets for tar products, and the old prices remain about the same. Solvent and heavy naphthas are steady, although there seems plenty to meet the demand. There is little inquiry for pitch, but the price is not affected.

The average values of gas-works products during the past week were: Gas-works coal tar, 19s. 9d. to 23s. 9d. Pitch, East Coast, 16s. to 16s. 6d. per ton. West Coast—Manchester 15s. to 15s. 6d., Liverpool 16s. to 16s. 6d., Clyde 17s. to 18s. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅛d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 2¾d. to 3d. per unit; "B" quality, ¾d. to 1d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Jan.* 20.

The continual withholding of export licences by the authorities has now had some effect on the position; and during the past week the market has become a little easier—a decline of 2s. 6d. per ton from the highest points recently attained having been recorded The nearest values at the close for prompt shipment are: £18 12s. 6d. f.o.b. Hull, £18 17s. 6d. f.o.b. Liverpool, and £19 per ton f.o.b. Leith. The lack of strength in the near position has been reflected in the forward months, and it has transpired that orders have been taken for delivery over the whole of the year at the reduced prompt prices.

Nitrate of Soda.

Another advance in the value of this material has taken place, and spot quotations are now 20s. 6d. per cwt. for ordinary quality, and 21s. per cwt. for refined.

Sulphate of Ammonia.

From another source, to-day's quotations are given as follows: Outside London makes, £17 17s. 6d.; Hull, £18 5s. to £18 7s. 6d.; Leith, £18 10s. to £18 12s. 6d.; Liverpool, £18 10s. to £18 12s. 6d.; Middlesbrough, £18 5s. to £18 7s. 6d.

Manchester District Tar Prices.

The average price realized for tar, based on the value of the products for December deliveries in the Manchester district, was 26s. per ton.

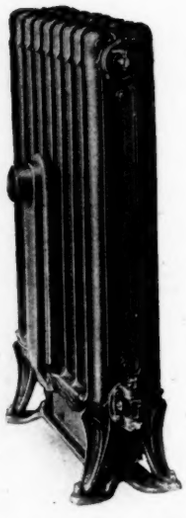
COAL TRADE REPORT.

Northern Coal Trade.

The lack of ready steamships has impeded shipment of coal; but the demand has been brisk enough to give activity in some branches of the coal trade. In steam coals, however, lessened Scandinavian exports have made the market quieter, and prices occasionally easier. Best Northumbrian steam coals are quoted about 30s. per ton f.o.b.; second-class steams are rather dull at from 23s. to 25s., and steam smalls are quiet, and vary from about 17s. 6d. to 21s. 6d. In the gas coal trade, there is a strong demand both for home use and for export; and there are heavy deliveries on the long contracts. Best Durham gas coals are firm at from 26s. to 27s. 6d. per ton f.o.b.; for second-class gas coal, the current quotation is about 21s. to 22s.; while for "Wear Specials" the price is near 30s. to 32s. 6d., with a good demand for the latter class. There are no large contracts yet in the market for gas coals, though Scandinavian needs are expected to be soon known. In coke, the home consumption is heavy, and exports are fair. Good gas coke is about 32s. 6d. to 33s. 6d. per ton f.o.b. in the Tyne. For export, freights are high—based on 43s. or thereabouts to the northern ports of France.

Hebden Bridge and Mytholmroyd Gas Board.—At the monthly meeting of the Hebden Bridge and Mytholmroyd Gas Board last Thursday, Mr. T. H. Nield (the Manager), reported a decrease of 2 million c.ft. of gas manufactured, as compared with the corresponding month of 1915. The Manager was requested to deal with a matter suggested by the Minister of Munitions in respect of oil-washing of gas. He reported that he had had an interview with Mr. G. Kay (representing the Union), regarding water-gas men's wages, and submitted a letter on the subject. The Board gave the Clerk instructions to reply that they cannot see their way to make any further offer. When accounts, amounting to £2239 12s. 3d. are paid, a debit balance of £1624 will be created.

Gas Heating for Munition Factories.



VENTILATING RADIATOR.

80 "RICHMOND" RADIATORS recently installed in a large Aircraft Factory. The popular demand for this method of heating offers ample scope for increasing business.

Selected because of simplicity of fixing, economy in working, ease of temperature control, saving of labour.

Richmond's Ventilating Radiators meet every requirement stipulated in the recent Government memorandum on the Heating of Munition Factories and Workshops, and our experience is placed at your disposal to co-operate on any proposition.

THE RICHMOND GAS STOVE & METER CO., Ltd.,
WARRINGTON AND LONDON.

More Light at Burnley.—There has in the last week been a great improvement in the lighting at Burnley. The summer restrictions of no street lights at all except in the centre of the town have been shown by the representatives of the leading trade unions to be against the wishes of the Home Office, and now a large number of lamps are lighted all night, to the great satisfaction of the public, who believe that, with ample warnings, they can be extinguished in a very short time.

Worthing Gas Company's New Issue.—The "JOURNAL" for the 16th inst. (p. 128) reported the holding of an extraordinary meeting by the Worthing Gas Company, at which powers were given to the Directors to raise £22 000 by way of loan capital. After the meeting, the Board instructed Messrs. A. & W. Richards to issue £15,000 of this amount in the form of mortgages bearing 6 p.ct. interest, to be redeemed at par seven years hence. On Messrs. Richards placing the particulars before their investing clientèle, the mortgages were quickly taken up; the £15,000 being all subscribed within a few days. This shows that investors have plenty of confidence in the gas industry, and that, notwithstanding the difficult times through which we are passing, when a good gas security is put before them on attractive terms they do not hesitate to take advantage of it.

Swansea Public Lighting Charge.—The Borough Surveyor has reported to the Swansea Town Council, upon interviews which have taken place between Mr. R. G. Clarry (Manager of the Gas Company) and himself, with a view to arriving if possible at some reduced charge for public street lighting; while the Town Clerk has reported with regard to the terms of the agreement between the Corporation and the Company, and a notice from the Company increasing the price of gas to the maximum of 3s. 4d. per 1000 c.ft. It was resolved that a Sub-Committee be appointed to meet the Directors and discuss the matter, so as, if possible, to obtain a reduction in the charges for public lighting.

Swansea and the Calorific Standard.—The Highways Committee of the Swansea Town Council report, with regard to an application by the Swansea Gas Company for an Order under the Calorific Standard Act, that the Town Clerk has informed them of the result of his communications with other authorities. In view of national interests, it was not considered advisable to oppose the Order in principle; but it was resolved that the Chairman and Town Clerk be authorized to take such steps as they may deem necessary, in concert with other authorities, with a view to obtaining concessions in the terms of the proposed Order, and for this purpose to arrange for, and attend, a meeting in London of authorities affected.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week was on a moderate scale on the whole, varying in volume from day to day, and occasionally falling dead-calm, and also exhibiting changes of tone—now dull and now brighter. Of course, the new loan has been the focus of attention and the mainspring of activities; and so it is likely to remain until the closing of the list on the 16th prox., when the excitement will have culminated—unless an extension of the time should be resolved upon. Various doubtful points in the prospectus have now been solved, and thus some possible obstacles in the path of would-be applicants are removed. One of these was that the interest on subscriptions appeared to accrue only from Feb. 16, not from date of payment. This injustice to the early applicant is now relieved. Another was he inacceptability of the new loan in paymentt of death duties unless the holding were six months old. This condition is abolished. Applications for the loan should now pour in more merrily than ever. The markets in general were to some extent affected by sales to provide moneys for investment in the loan; and prices in various lines had a setback.

Briefly to review the week: Gilt-edged lines were fairly firm, especially after the lowering of the Bank rate. Home Rails were irregular, and Americans and Argentines were dull. The Foreign Market was healthy: French recovering firmness, and Russian, Chinese, and Japanese being fair. Many miscellaneous items were easier—*e.g.*, Rubber, Oil, Textiles, Banks, and Ships.

Business in the Gas Market was about on an average of recent weeks, and prices did not indicate any tendency to vary much from what has been the prevailing run of values during that period. The first dividend announcement for the second half of 1916 is out. The Gas Light and Coke Company will pay a dividend at the rate of £4 4s. p.ct. per annum (the same rate as the last dividend), and will carry forward a balance of £351,000 of undivided profits. The Money Market was firm prior to the lowering of the Bank rate on Thursday, when the position assumed greater ease.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 71, 71¾, 72, ditto maximum 56⅜, 56½, ditto preference, 69½, 70, Primitiva 40s., South Metropolitan 77½, 77¾, 78, On Tuesday, Bombay 5 9/16, Gas Light ordinary 71, 71½, 72, Monte Video 8¼, Primitiva preference 60s., ditto debenture 79, South Metropolitan 77½, 77¾. On Wednesday, Brentford "A" 86½, Gas Light ordinary 70, 70¼, ditto preference 69, 69½, 70, ditto debenture 56½, 56¾, 57, Imperial Continental 75½, Primitiva 40s. 7½d., ditto debenture 79½, South Metropolitan 77¼, 77¾. On Thursday, Commercial 3½ p.ct. 68, Imperial Continental 74, 74½, Kingston 87½, Primitiva 40s., ditto preference 57s. 6d., 60s., 62s. 6d., South Metropolitan 77, 78, 78½, 78¾. On Friday, Gas Light ordinary 70½, 71, South Metropolitan 77½, 77¾, 78¼. On Saturday, Brentford "B" 82¼, 82½, Gas Light ordinary 70¼, 71⅛, Imperial Continental 74, 74½. Primitiva preference 57s. 6d., 58s. 9d., 60s., ditto debenture, 79½, South Metropolitan 77½, 78½, South Suburban 81, 81¼, ditto West Kent 69½, 70.

The Bank rate is 5½ p.ct., having been lowered on the 18th inst. from the 6 p.ct. rate fixed on July 13, 1916.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div per Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	65—70	..
1,551,868	"	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	62—64	..
874,000	"	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63*	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅛	5—5½	5 3/16
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c. 4 p.c. Deb.	29—30	25—27	..
388,110	10		7	7/-		15—15½	11—11½	..
115,000	10	"	6	6/-		13½—14	9½—10	..
159,740	—	—	—	4%		..	71—73	..
992,045	Stk.	Feb. 26	†14	55/-	Brentford A Consolid.	261—266	85—87	86½
734 920	"	"	†11	53/9	Do. B New	204—209	82—84	83¼—82½
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	85—90	..
221 400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	67—69	..
217 380	"	Feb. 26	11	10¼%	Brighton & Hove Orig.	208—213	160—165	..
244,200	"	"	8	7¾%	Do. A Ord. Stk.	154—159	115—120	..
530 000	20	Mar. 26	12½	22/6	British	44—45	34—35	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245.771	"	"	4	4%	Buenos Ayres 4 p.c. Deb.	85—87	58—63	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	1¼—1⅞	..
190,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	4¼—5	..
100,900	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	82—83	..
1,513,280	"	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	73—75	..
560 000	"	"	5½	46/8	Do. 3½ p.c. do.	103—105	68—70	68
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	36—38	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	58—60	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	175—185	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	100—105	..
55 000	"	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,032,180	10	July 29	10	7/6	European, Ltd.	17½—18	11—12	..
16 313 480	Stk	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds	98—102	70—72	70—72
2.600 000	"	"	3½	3½%		76—79	55—58	56¼—56½
4,064,235	"	"	4	4%		96—99	69—71	69—70
4,674 850	"	June 11	3	3%		72½—74½	56—58	56½—57
130 000	"	"	10	10%		..	..	..
2 8,740	"	Mar. 12	5	4½%	Hastings & St. L. 3½ p.c.	87—89	78—83	..
70 000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	8—9	..
86,600	—	—	—	9½%	Horsham 7 p.c.	..	125—135	..
131,030	Stk.	Mar. 12	7½	7½%	Ilford A and C.	151—154	105—110	..
65,780	"	"	6⅔	5⅔%	Do. B	115—118	92—97	..
65.000	"	June 26	4	4%	Do. 4 p.c. Deb	92—94	71—74	..
4,910,000	"	May 14	9	4½%	Imperial Continental	150—160	73—78	74—75½
1,235,000	"	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	"	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	87—92	..
2,498,905	"	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A B	211—213 146—148	85—87	.. ..
306,083	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	74—76	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	3¾—4½	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	89—93	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	8½
1,875,892	Stk.	July 29	4½	4½%	Newcastle & Gatsh'd Con.	98¾—99½	79—80	..
529,705	"	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	75—77	..
55,940	10	Feb. 26	7.14/0	7/8⅔	North Middlesex 7 p.c.	14—15	10½—11½	..
300,0 0	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,0 0	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼—7⅝	2—3	..
60,000	50	Feb. 26	13	12½%	Portsea, Island B	128—131	95—100	..
100,000	50	"	12	11%	Do. C	118—121	88—93	..
52,000	50	"	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5¾—6	2—2¼	40/—40 7½
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4¾—5	55 —65/-	57/6—62 6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	79—79½
—	—	—	—	4%	Do. " " 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	61—67	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10¾—11	8—8½	..
125,000	50	July 1	5	5%		47—49	42—44	..
135,030	Stk.	Mar. 12	10	10%	Sheffield A	223—224	188—192	..
209,984	"	"	10	10%	Do. B	223—224	188—192	..
523 500	"	"	10	10%	Do. C	2 0—222	188—190	..
90,000	10	May 28	9	6/-	South African	10¾—11¼	..	..
6,603,835	Stk.	Feb. 10	5/4/0	44/-	South Met. 4 p.c. Ord.	111—113	77—79	77—78½
1,895,445	"	July 10	3	3%	Do. 3 p.c. Deb.	72½—74½	56—58*	..
221,822	"	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	145—147	..
952,795	"	"	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	80—82	81—81½
60,000	"	"	5	5%	Do. 5 p.c. Pref.	110—112	79—81	..
135 000	"	—	—	48/4	Do. West Kent	..	..	69½—70
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	88—90	..
647,740	"	May 14	5	5%	Southampton Ord.	99—102	77—79	..
120.000	"	Feb. 12	7½	7½%	Tottenham District { A 5 p.c. B 3½ p.c. 4 p.c. Deb.	135—138	120—123	..
782,275	"	"	6	5⅝%		115—117	89—91	..
181.255	"	June 26	4	4%		87—89	65—67	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	108½—109½	91—92	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	"	Feb. 26	8⅔	78/9	Wandsworth A 5 p.c.	151—156	117—122	..
255 636	"	"	6⅓	63/9	Do. B 3½ p.c.	129—134	101—103	..
108.075	"	"	5/17/8	55/1⅓	Do. C 3½ p.c.	110—115	88—93	..
352.000	"	"	6⅓	57/6	Wimbledon 5 p.c.	117—122	90—95	..
98,000	"	"	6⅔	63/9	Epsom 5 p.c.	121—126	98—103	..
88 416	"	June 26	3	3%	3 p.c. Deb. Stk.	66—69	51—54	..

* Ex. div. † Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

Lisburn Gas Undertaking and Maximum Prices.—A deputation from the Lisburn Urban District Council has waited on the Chief Secretary for Ireland, at Dublin Castle, to appeal for the necessary power to enable urban councils or similar bodies in Ireland who have control of gas undertakings to increase the price of gas to consumers beyond the limit provided by their Local Acts. In Lisburn, the maximum is 4s. per 1000 c.ft. Mr. T. Sinclair, J.P. (the Chairman) emphasized the urgent necessity for a provision like that advocated; pointing out that the loss last year was £2300, while in the year ensuing it was estimated that there would be a deficit of £3000. Mr. Duke gave an attentive hearing to the views put forward, and indicated that he was alive to the difficulties with which public bodies had to contend. The matter remains under his consideration.

Gas "Leakage" at Saffron Walden.—At the monthly meeting of the Saffron Walden Town Council, Alderman Gilling (Chairman of the Gas Committee) said that lately there had been a great loss of gas—19 p.ct. of the whole amount made, which, for the quarter ended Sept. 30, represented a loss of £161. They had tried to find out where the "leakage" occurred, and had come to the conclusion that it was mainly due to the meters not registering properly. Naphthalene had been accumulating in the meters for some time. The remedy for this was petroleum vapour with the gas. The vapour would not always have to be used, after they had had a vaporizer going for some time; and while they were using it, the candle power of the gas would be slightly increased. It would take four weeks to secure a vaporizer, and the Committee considered that one should be obtained. This course was agreed to.

Stove Hire in Dublin.—The Directors of the Alliance and Dublin Gas Consumers' Company have issued a circular stating that, having carefully considered the objections and representations which they had received from consumers regarding the revised hiring rates for stoves—5s. a quarter, as against 2s. 6d.—they had decided to withdraw the new rates and to revert to the old charges in force in the case of those customers who have had cooking or heating stoves on hire for a period of one year and upwards. Consumers who had already signed and returned the agreement forms received information that such agreement may be regarded as cancelled, and it is added that consumers desiring to purchase their stoves can do so on the most favourable terms. In order to popularize gas cooking-stoves, the Company have engaged a lady expert to give lectures on certain afternoons in Molesworth Street Hall, Dublin, and at the Kingstown and Dalkey Town Halls.

The Position of Sulphate of Ammonia.—Addressing a meeting of farmers at Hereford last Wednesday, Mr. Prothero (the President of the Board of Agriculture) said, with regard to fertilizers, that all but sulphate of ammonia and basic slag were obtained from abroad. The Government hoped to be able to place at the service of farmers a sufficient supply of sulphate of ammonia; but time was against them. As to basic slag, any quantity of it was produced in this country; but they had not the men or the machinery to grind it. Here, again, they were up-against time; but they were getting the men and machinery, and he hoped there would be a very large supply for the farmers. At the Farmers' Union meeting held later the same day, Mr. Andrews urged that as the Government considered wool a bye-product in fixing wool rates, they should apply the same principle to basic slag and sulphate of ammonia, and allow these commodities to be similarly sold at 30 to 35 p.ct. advance on the pre-war prices.

The battery-room and its equipment at the station of the Merthyr Electric Light and Traction Company, Ltd., was destroyed by fire on the 9th inst. "The cause of the outbreak is unknown," says the "Electrical Review."

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral European Countries unless posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral European Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

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Appointments, &c., Vacant.

ENGINEER. Tunbridge Wells Gas Company. Applications by Jan. 31.

ENGINEER AND MANAGER. Castleford and Whitwood Gas Company.

ACCOUNTANT. Newark Gas Company.

WORKING FOREMAN. Ilfracombe Gas-Works.

CARBONIZING FOREMAN. No. 6266.

METER REPAIRER. Worthing Gas-Works.

FOREMEN. No 6263.

GAS-FITTERS. Worthing Gas-Works.

GAS-FITTERS AND METER REPAIRERS. Guernsey Gas Light Company.

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AMMONIACAL LIQUOR STILL. Robin Hood Coke Works, near Wakefield.

Tank Waggons Wanted (Hire or Purchase).

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Meetings.

BRENTFORD GAS COMPANY. Caxton Hall, Westminster, Feb. 9. 2.30 o'clock.

GAS LIGHT AND COKE COMPANY. Chief Office, Horseferry Road, Westminster, Feb. 9. Twelve o'clock.

SOUTH METROPOLITAN GAS COMPANY. Cannon Street Hotel, Feb. 14. Two o'clock.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY. No. 689, High Road, Tottenham, Feb. 17. Three o'clock.

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